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VAN DOREN HALL. DOMESTIC ECONOMY BUILDING, WASHINGTON STATE COLLEGE
(See October JOURNAL, p. 395).

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A STUDY OF HOUSEHOLD EXPENDITURES.[a]

BERTHA M. TERRILL.

Many problems confront the housekeeper of today which have risen from inventions unknown a generation ago. This is especially true of food supplies and methods of food preparation.

The following study is an attempt to throw some light upon: (1) The comparative cost of coal, gas and oil as fuels in food preparation; and (2) some factors regarding the purchase of foods.

The study has been necessarily limited and its chief value will lie in suggesting directions in which discriminating selections should be made, based upon more substantial grounds than fancy, the words of the dealer or the oft-times erroneous superficial judgments of value. It has not been possible to include a discussion of many points closely related to those considered in the studies made, such as the time and labor involved; the possible use of a coal range for other than cooking purposes, as heating hot water and warming the kitchen or other rooms; and the possible avoidance of the dirt and discomfort of a coal range, all of which questions and others should be weighed in connection with those discussed in the studies given.

(1) *Cost of fuels.*

In testing the cost of the application of heat to foods a study was made of: (a) Coal and gas ranges, an Aladdin oven and a fireless cooker; (b) the relative cost of cheap cuts of meat and higher priced cuts when gas is used in their preparation; and (c) the difference in cost of gas when used carelessly and when carefully regulated.

Tests with coal and gas ranges and an Aladdin oven.—What might be regarded as typical processes were selected, the tempera-

[a] This is a condensation of a dissertation submitted to the Faculty of the Graduate School of Arts and Literature in candidacy for the degree of Master of Arts. Department of Household Administration, University of Chicago, 1908.

ture and length of time of cooking in each case being such as are considered most desirable. These were kept uniform as far as possible.

The tabulated results with the coal stove were as follows:

RESULTS WITH A COAL STOVE.

Kind of Food.	Amount.	Temp.	Time.	Fuel Used.	Cost.
		Deg. C.	*Hours.*		*Cts.*
Beef, roast	2 lbs., 7 oz.	195	1.25	Coke, 3 lbs., 6 oz.; coal, 11 lbs., 10 oz.	5.60
Beef, corned	3 lbs., 8 oz.	—	5	Coke, 5 lbs.; coal, 17 lbs., 4 oz.	9.13
Stew	2 lbs., beef, round Vegetables	—	4	Coke, 4 lbs., 13 oz.; coal, 6 lbs., 5 oz.	4.06
Bread	3 loaves	165 175	1	Coke, 3 lbs., 6 oz.; coal, 20 lbs. 11 oz.	4.23
Beans, baked(1)	3 ½ qts. (dry)	165	8.5	Coke, 6 lbs., 1 oz.; coal, 20 lbs. 11 oz.	10.0
Beans, baked(2)	1 cup (dry)	100	16	Coke, 3 lbs., 6 oz.; coal, 8 lbs., 12 oz.	4.44
Cake	1 loaf	195	1	Coke, 3 lbs.; coal, 5 lbs.	2.94

The following results were secured with the gas range:

RESULTS WITH A GAS RANGE.

Kind of Food.	Amount.	Temp.	Time.	Amount of Gas Used.	Cost.
		Deg. C.	*Hours.*	*Cu. Ft.*	*Cts.*
Beef, roast	2 lbs., 6 oz.	195	1.25	33	2.8
Beef, corned	3 lbs., 4oz.		5	45.42	3.86
Stew	2 lbs., beef, round Vegetables		4	25.26	2.14
Bread	3 loaves	180	1	20.5	1.74
Beans (1)	3 ½ qts. (dry)	165	8.5	191.25	17.25
Beans (2)	1 cup (dry)	115	16	123.87	10.52
Cake	1 loaf	195	1	25	2.12
Soup	2 qts. water, 3 lbs 1 oz. bone		6	12.41	1.05
Beef, roast	4 lbs.		5	45.42	3.86
Lima beans	2 cups, dry		1	3.15	0.25

The results given on the opposite page were obtained with the Aladdin oven:

RESULTS WITH THE ALADDIN OVEN.

Kind of Food.	Amount.	Temp.	Time.	Amount of Kerosene Used.	Cost.
		Deg. C.	*Hours.*		*Cts.*
Beef, roast	2 lbs., 1 oz.	100	4.5	10 oz.	1.15
Beef, corned	4 lbs., 8 oz.	135	5	2 lbs., 5 oz.	4.26
Stew	2 lbs. beef, round, Vegetables	145	4	1 lb., 5 oz.	2.42
Bread	3 loaves	155	1.75	10 oz.	1.15
Beans, baked (1)	3 ½qts. (dry)	135	8.5	2 lbs., 7 oz.	4.5
Beans, baked (2)	1 cup, dry 2 qts. water, 3 lbs	100	16	1 lb., 7 oz.	2.65
Soup	4 oz. bone	100	6	14 oz.	1.66

In these experiments the fires were lighted and used exclusively for preparing the one dish at a time. The amount of fuel consumed was carefully measured, the coal by weight, the gas by meter and the oil as a fraction of a gallon (1 quart oil = 26 ounces). The cost of fuel is based on local Chicago prices, viz. coal $7.75 per ton (2,000 lbs.); coke $6.75 per ton (2,000 lbs.); gas $0.85 per 1,000 cu. ft.; and kerosene $0.12 per gallon[a].

It is not surprising to find that the cost of starting and maintaining the necessary fire in the coal range exceeds in each case the cost by any other method of preparation. This is due to the impossibility of confining and controlling the heat. When the correct temperature was secured for each single process there was ample space and heat in excess to do much more at the same time. This emphasizes the economy of the coal range when many processes may be carried on at once, as well as the wastefulness of maintaining the fire for a single or simple preparation.

This is further illustrated by a second study in which a dinner was prepared by each of the first three methods. The menu consisted of stock soup with tapioca; roast beef; browned potatoes; spinach; cranberry jelly; and bread pudding with meringue. The results are summarized in the following table:

COMPARATIVE COST OF COOKING A DINNER.

Kind of Stove Used.	Fuel Consumed.	Cost.
		Cts.
Coal Range	Coke 2 lbs., 12 oz. Coal 13 lbs., 4 oz.	6.05
Gas range	Gas 27 ft. Gas (for cooking soup) 12.41 ft. } = 39.41 ft.	3.34
Aladdin oven	Kerosene 1 lb., 3 oz. Kerosene, (for cooking soup) 14 oz. } = 2 lbs., 7 oz.	3.53

[a] In comparing these results with those obtained by Miss Rinaker (p. 409) the great difference in the prices paid for coal should be noted. See also page 454.

Here the expense is more nearly uniform. It will be noted that the cost of preparing the soup stock is not included as an extra expense with the coal range since there was ample heat and space to have prepared that with the same fire. It is legitimately added as an extra item to the cost of preparation in the other two cases, since it requires an extra burner in the case of the gas and the oven of the Aladdin oven was so filled with the other dishes to be prepared that there was no room for it at the same time.

With the original pans designed for the oven the space is more perfectly utilized than with the other household dishes, so that with those it might be possible to eliminate this additional cost.

Relative cost of fuel with low priced and higher priced meats.—One frequently hears the statement that if one is using gas as a fuel it is not economical to buy cheap cuts of meat which require long cooking, since the cost of fuel to prepare more than counterbalances the difference in price between such meats and those higher in price. The following table shows this to be erroneous, if the amount of fuel is intelligently regulated. The large amount of gas consumed in the short process, because of the more intense heat required, is nearly equal to that consumed in the longer process, provided the supply of gas is limited to the small amount necessary and desirable for the proper preparation of the cheaper cuts.

COMPARATIVE COST OF COOKING DIFFERENT MEATS.

Kinds of Meat.	Amount.	Cost.	Time Cooked.	Gas Consumed.	Cost of Gas.
		Cts.	*Hours.*	*Cu. Ft.*	*Cts.*
Porter house steak (serve 5 people)	2 lbs. 8 oz.	75	0.2	13.18	1.12
Rib roast (4th rib) (serve 8 people)	2 lbs., 6 oz	50	1.25	33	2.8
Stew (Beef, round)	2 lbs.	28	4	25.26	2.14
Beef, corned (rolled brisket) (serve 12 people)	3 lbs. 4 oz.	52	5	45.42	3.83
Pot roast (shoulder) (serve 12 people)	4 lbs.	52	5	45.42	3.83

The difference in cost of these meats and the number which each would serve should be considered together with the cost of fuel.

Tests With Careful and Careless Regulation of Burners.—The amount of gas consumed by a careful regulation of the supply as

compared with a careless use can be easily estimated from the following study. In this it was found that to consume one cubic foot of gas, there was required with 2 oven burners wide open, 1 min.; 1 oven burner wide open, 2 min.; and 1 oven burner about one-half open, 3 min. On the top of the stove, one cubic foot of gas was consumed by the double jet wide open in 2 min.; by the inner jet wide open in 4¼ min.; by the burner at simmering height in 29 min.; and by the burner at just boiling height in 15 to 19 min. From this it is seen that the consumption necessary, for instance, to prepare meats like stew, pot roast, corned beef and to cook vegetables should not exceed 1 foot in 15 to 19 minutes, while the frequent habit of turning the gas on fully for such cooking requires 1 foot in 4 to 5 minutes.

The desirable height of burners to give the amount necessary to maintain correct temperatures for the different processes of cooking is difficult to describe, but it is well worth the use of a thermometer to determine. Much less is required than is usually used, though this would result in a better product and smaller expense.

A very satisfactory means of economizing in the use of gas, especially with a small family, is by making use of a small oven set on the top of the stove. The economy in the space to be heated and in radiation of heat makes a marked difference in the amount of gas consumed. With an asbestos mat fitted into the lower part most foods can be very satisfactorily prepared in this way. Tests were made with a small sized oven, over one burner. This required 1 foot of gas in 16 minutes to maintain a temperature of 165° and 1 foot in 15 minutes for 195° in contrast to the consumption in the larger oven of 1 foot in 3 minutes 40 seconds for 165°, and 1 foot in 3 minutes for 195°, showing a consumption of five times as much gas by the larger oven.

Tests With a Fireless Cooker.—The results obtained with a fireless cooker are summarized in the following table. In making use of a fireless cooker the only expense for fuel is, of course, that necessary to start the process of cooking before a food is put into the cooker. It is desirable to vary this somewhat according to the nature of the food to be cooked, that the heat may better penetrate.

The foods cooked by this method were uniformly well cooked, quite equal to those cooked by the other methods, and in some cases, as the beets and ham, still better.

RESULTS WITH THE FIRELESS COOKER.

Kind of Food.	Amount.	Time on Gas Range.	Fuel Consumed.	Cost.
		Minutes.	*Cu. Ft.*	*Cts.*
Rolled oats	2 cups[a] (dry)	5	0.2	0.017
Rice, boiled	2 cups[a] (dry)	5	0.2	0.017
Beets	6	15	1	0.085
Lima beans	2	10	0.67	0.056
Ham	5 lbs.	30	2	0.17
Stew (Lamb)	2 lbs.	15	1	0.085

[a]Before adding water.

The cost is, of course, decidedly low. At the same time it is worthy of consideration that only a limited number of dishes can be prepared in this way, since only those can be satisfactorily prepared which allow of liquid either to cover, as in boiling, or to surround, as in steaming. Since the economy of fuel is trifling in a single case one should be assured that the opportunities for its use would be considerable, to warrant the purchase of a cooker at a cost of $10 to $15. If, however, one makes use of a home-constructed cooker, as may easily be done, the expense is merely for close granite-ware receptacles for the food and for the necessary material. A very satisfactory cooker may be made with an old trunk filled with hay pillows.

2. *Purchase of Food-Supplies*

In connection with the purchase of food supplies the present study has concerned itself with a consideration of: (a) The quantity of any supply desirable to purchase at one time; (b) buying in bulk or in packages; and (c) the value of different styles of package goods.

Quantity of Food-Supply at a Single Purchase.—The problem of the quantity of any supply which one may advantageously purchase at one time resolves itself into the questions of the money profit, and the extent to which it is possible to store or use a considerable supply. In seeking an answer to the first of these one finds interesting diversity of conditions, although in general, it is quite evident that at the present time less is saved by increasing the quantity purchased than formerly. Fewer merchants offer such inducements as "ten cents each, three for a quarter." Competition has reduced the margin of profits for

the retail dealer so that he has less range of price. He has adapted himself to the demand for small orders and frequent deliveries. There is a slight gain, usually, in such package goods as one can get by the dozen or even a fraction of a dozen. A more marked gain is possible when the amount purchased can be made large enough to strike out entirely the retail dealer with his profits and purchase of a wholesale dealer, when possible, or at practically wholesale prices. The individual housekeeper with average family can avail herself of this method at best in the case of only a limited number of supplies.

The present limitations in storage facilities are too well-known to the majority of housekeepers to need setting forth. All additional space means, to apartment dwellers, increased monthy rent, and suitable temperature for the storage of many supplies is impossible. This renders some advantageous purchases out of the question. Potatoes at 1.6 cents per pound by the bushel in contrast to 2 cents per pound in small quantity so deteriorate under unfavorable conditions as more than to offset the gain in buying the larger quantity. This holds true of other fresh vegetables and fruits.

It may, however, be questioned, we believe, whether we do not adjust ourselves too complacently to this condition and so overlook possible advantages which careful attention may discover as real and possible. There are considerable differences in some instances, a knowledge of which would materially aid in reducing expenses. The different sizes of olive oil cans, for instance, occupy practically the same space, while the reduction in cost for the larger amount is worth considering. Thus a 1 quart can costs $0.65 and a 2 quart can only $1.15. The decrease is not always proportionate to size. For instance, in three sizes of peanut butter, costing 10, 20 and 30 cents, the weight of the contents were for the 10-cent jar, 96.7 gms.; for the 20-cent jar 197.5 gms., and for the 30-cent jar 404.4 gms. so that while the prices were in the ratio of 1:2:3 the ratios of the weights of the contents were 1:2.04:4.18. This showed practically no advantage in the medium sized over the smaller amount, but a gain of twenty-five per cent in the largest sized jar. Of course this presupposes sufficient need of any product to warrant its purchase in large amount and such control of its use as to prevent wastefulness.

Bulk vs. Package Purchases.—When we compare the purchase of food supplies in bulk or in package we recognize at once the fact that packages are a more convenient and more sanitary form. Still, we do not always realize the price we pay for the difference. By making use of the package form the producer has found an ingenious and successful opportunity to cover the enormous expense arising from competition and advertising. The burden of this expense is eventually borne by the consumer, through scant measure, inferior quality or higher price. There is no doubt, for example, that the largest part of the 15 cents paid for a package of prepared cereal is the cost of advertising. This increase in cost represents no increase in nutritive value. Some labor and skill are involved, and some cost in fuel to prepare might be legitimately added, perhaps, to the cost of the uncooked forms, but this would be but a slight increase (see table on gas consumption). The increase is largely for advertising a process or manipulation, to answer the demand for novelty products, plain rice and corn meal mush having fallen under the ban as too "common," or troublesome.

It is easy to see the rate of increase in comparing the cost of the few cereals now available in bulk with some of the package products. Thus, rice in bulk, costs 8 to 10 cents per pound and the puffed rice 10 cents per package of 163.3 gms., which is at the rate of 27 cents per pound. Corn meal costs 2½ cents per pound, but corn flakes sell for 10 cents per package of 315.3 gms., or 14.3 cents per pound, so that only careful discrimination can discover true value. A further comparison of prices is found in the following illustrations:

A can containing 132.5 gms. of dried beef and costing 15 cents, or at the rate of 51 cents per pound was inferior in quality to that selling in the same market at the time for 35 cents per pound. Sliced bacon was selling in glass jars containing 268.3 gms. at 28 cents per jar, or at the rate of 47 cents per pound. In bulk the same day, a product superior in quality could be obtained for 25 cents per pound, and a pasteboard package of bacon was also on sale equal in weight and quality to that purchased in bulk.

The following table shows the comparative cost of different commercial brands of gelatine and sheet gelatine. In this case the strength and quality varied somewhat in favor of the higher priced, although not commensurately.

COMPARATIVE COST OF PROPRIETARY AND SHEET GELATINES.

Kind of Gelatine.	Weight of Package.	Cost of Package.	Weight of Gelatine.	Cost per Pound.
	Gms.	*Cts.*	*Gms.*	*Cts.*
C—	59	12.5	44.2	126
K—	45	15	33.5	195
K—e	63.1	12.5	42.2	129
P. R.	80.2	12.5	54.3	107
Sheet Gelatine	453.5	87		87

Filled dates in a glass jar selling at 25 cents consisted of 38 dates, weighing 239.2 gms., 7.8 gms. of walnut meats, 7.4 gms. of pecan meats, and 8.9 gms. of almond meats. In bulk, 38 dates, weighing 236.4 gms. cost (12 cents per pound) 7.8 cents; 7.8 gms. walnut meats at 60 c per pound cost 1 cent; 7.4 gms. pecan meats at 60c per pound cost 0.9 cents and 8.9 gms. almond meats at 60c per pound cost 1.1 cents, making the total cost 10.8 cents.

With corned beef hash, 187.2 gms. cost 20 cents or at the rate of 48 cents per pound. This expense would be in most homes a case of paying for "left-overs," since few thrifty housekeepers would buy fresh materials for this particular product. Provided one should, the comparative cost, as nearly as we could judge of the proportions in its composition, would be about 9.3 cents for $\frac{2}{3}$ lb. corned beef at 14 cents per pound, and 0.6 cents for $\frac{1}{3}$ lb. potatoes at 2 cents per pound, a total per pound of 9.9 cents.

In some cases advantage seems to be taken through the style of package. Perhaps the most striking example is found in the different forms in which olive oil is offered. In no case in the samples examined did the bottles of oil contain the amount expected, while all the cans of oil tested contained uniformly full measure. What would be thought of as a half-pint bottle contained a scant three fourths cup oil, or 143.1 gms.; a "pint" bottle contained one and one half cups oil, or 315 gms.; a "quart" bottle a scant two and two thirds cup, or 550 gms. and another "quart" bottle three and one half cups, or 735 gms. On the other hand two quart cans contained 806.1 gms. and 840 gms. respectively.

From these illustrations we see how impossible it is for any general rules to prevail, by observance of which the most successful purchasing may be accomplished. The infinite variety

of forms on the market makes a classified study of their merits impossible. Such a list could never be complete while the mushroom growth of the present time brings new forms almost daily. It is hoped, however, that the studies thus outlined may suggest the direction in which attention may profitably be turned by the housekeeper who aspires to secure the best results from her expenditures in the direction of food supply and its preparation.

There is a further very important factor which has not been included in this study which is, nevertheless, closely connected with many of the points discussed. This is the question of the time and labor involved. An increasing number of housekeepers have, either through necessity or choice, demands upon their time and strength which makes this an important consideration. To what extent may one be justified in a larger expenditure which results in a liberating of thought and energy for other things? This should be determined for each individual by a consideration of the possible usefulness of the time liberated together with a knowledge of the degree of difference in expense and in the quality of what may be purchased ready-prepared compared with the home product. It is to be regretted that little accurate investigation has yet been made in this direction. The study made by Miss Bigelow[a] under the direction of The Boston Branch of The Association of Collegiate Alumnae is a valuable contribution and suggestive of much more which might profitably be studied.

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[a] Mass. Bur. Statistics of Labor, Bul. 19 (1901). p 67.

FUELS AND THEIR UTILIZATION IN THE PROCESSES OF COOKING.[a]

HARRIET BECKWITH RINAKER.

Fuels used to produce heat for cooking purposes can be compared first under the heads of kindling temperature, rate of combustion, efficiency, ease of manipulation, disposal of by-products of combustion, and cost. If the kindling temperature be too low the element of danger from explosion is great, incurring great fire risk and menacing personal safety. If the kindling point is high a considerable time may be required to reach a suitable temperature for cooking. The rate of combustion must be considered, together with the possibility of controlling the process in order that the heat given off may be utilized to good advantage. A study of the heating efficiency is made to determine whether this is an economical proportion to the amount of fuel consumed and the labor required for the operation. The question of manipulation must be taken up. The saving of time as well as of labor is of importance to the housekeeper. A fuel may possess a good kindling temperature, high heating efficiency, and an easily controlled rate of combustion, and yet be so inconvenient of manipulation, or yield such troublesome by-products of combustion that it ranks low in desirability.

Further, the cost of the fuel used must be considered, not only as regards the price paid for the fuel itself, but the cost of the equipment necessary to handle it properly, as well as the whole cost in proportion to the efficiency obtained. While the cost price of a given fuel may vary in different locations, due to natural distribution of fuels, the same general conditions as to cost of equipment are likely to be fairly comparable.

Discussion of Fuels in General.—The fuels which are generally considered available for cooking processes are anthracite and bituminous coal; hard and soft wood; coal oil or kerosene and gasoline; natural and artificial gas; and electricity. A discussion of these with regard to the points mentioned as essential to a good fuel for cooking purposes will serve to point out their relative desirability.

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[a] This is a condensation of a portion of a thesis submitted in partial fulfillment of the requirements for the Degree of Master of Arts in Household Science in The Graduate School of the University of Illinois, 1909.

The comparison of various grades of coal as given in the following table[a] is interesting.

COMPARATIVE COMPOSITION OF VARIOUS GRADES OF COAL.

Kind of Coal.	Coke or Fixed Carbon.	Volatile Gases.	Moisture.	Ash.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*
Bituminous	40–75	20–50	3–10	2–10
Semi-bituminous	70–80	10–20	1– 5	4–10
Semi-anthracite	80–90	5–10	1– 3	3– 5
Anthracite	85–93	3– 6	1– 3	3– 5

Thus anthracite coal, with its extremely high kindling temperature, as indicated by the high percentage of carbon and small amount of volatile gases, may be considered an undesirable fuel in this connection, for although the heating efficiency is high and a very small amount of ash is formed, the difficulty of burning this coal in any but a specially constructed fire box, and its slow rate of combustion, as well as its scarcity and relatively high price, make its use disadvantageous.

Bituminous, or "soft" coal on the other hand is widely used as a kitchen fuel. The supply is widely distributed and its cost comparatively low. Having a much lower ignition point than that of anthracite or "hard" coal, its heat is much more readily available. There is however, a high percentage of waste products—cinders, smoke and soot—so that it is considered by housekeepers a "dirty" fuel. Owing to its rapid rate of combustion more coal must frequently be added to the fire, while but a small amount of the heat given off can be utilized for cooking purposes, the remainder escaping up the chimney or heating the air of the room. W. R. Cooper states before the British Institute of Electrical Engineers that "Cooking in the ordinary kitchen range might almost be said to be a by-product of wasted heat"—an apt setting forth of the situation.

Wood, with from 20 to 30 percent fixed carbon, 55 to 65 percent volatile gases, 15 to 20 percent moisture and 1 to 3 percent ash, has been extensively used as kitchen fuel. It has a good kindling point, but the rate of combustion is rapid and not easily controlled, and while this fuel is a good source of quick heat, it

[a] *The Elements of Physical Science*, by F. D. Barber.

requires constant replenishing. The percentage of ash and smoke produced is low. However, owing to the comparatively limited supply and the questionable economy of using as fuel a product having so many other important uses, the use of wood as fuel is decreasing.

Both kerosene and gasoline are used quite commonly as fuels, there being little heat wasted, the rate of combustion easily controlled and but small amounts of waste products formed. However, especially in the case of gasoline, with its extremely low flashing point, there is great danger of explosion unless the operator has a good understanding of the principles involved in its use, and the apparatus for its combustion is carefully constructed. There are on the market good so-called "self-generating" stoves, as well as good kerosene stoves, the cost of manipulation being low in both cases.

Natural gas, underlying certain regions and supplied at a very low cost, combines some of the most desirable characteristics of a fuel. With a low kindling point, high heating efficiency, rate of combustion entirely under control, clean and convenient, it is quite ideal. However, gas wells are found in but limited regions, and outside of these districts natural gas cannot be supplied at any price. It may be added that natural gas, being usually devoid of characteristic odor, if escaping may cause danger from asphyxiation or explosion.

Artificial gas is more generally used, having all the advantages of natural gas, save that of cost, and being available in all parts of the country where coal is used. Since one ton of good gas coal produces, roughly speaking, 10,000 cubic feet of gas with 1400 pounds of coke, 120 pounds of coal tar and considerable ammonia as salable by-products it would seem that artificial gas could be put on the market at a price which would compare favorably with that of coal.

Electricity, which has only recently been made use of in cooking processes, presents some unusual advantages to the housekeeper. Being available from the moment the switch is turned there is the minimum amount of labor required to secure the heating efficiency. There is also little trouble in its manipulation, no appreciable loss of heat in the room, and no by-products of heat generation. The high cost of power and of the cooking utensils appears to be the greatest factors in preventing its more

general adoption. Mr. Cooper in the address previously referred to says, "It seems strange that the coal so wastefully used in the kitchen range cannot be converted into electricity in the power station and be transmitted to an electrical stove in the kitchen with a saving of cost of the house-holder."

Experimental Studies of Fuels.—The fuels selected for study were bituminous coal, artificial gas, and electricity. The basis of comparison was the cooking of typical meals for a day, viz. breakfast, luncheon and dinner, for a family of four persons. These meals were prepared with each of the fuels considered. The menus used were as follows:

Breakfast.—Fruit; pearls of wheat; cream; broiled bacon; baking powder biscuit; coffee.

Luncheon.—Meat croquettes; peas (canned); Parkerhouse rolls; baked apples; sponge cake; cocoa.

Dinner.—Tomato soup; wafers; roast beef; brown potatoes; scalloped corn; fresh bread; lettuce salad with cooked dressing; fruit short cake; coffee.

Tests with Coal.—The coal used is known to the trade as "Pocahontas," being a West Virginia bituminous coal and having the following composition as supplied by S. W. Parr, Professor of Applied Chemistry in the University of Illinois: Ash, 5.26 percent; moisture, 0.56 percent; volatile matter, 16.50 percent; fixed carbon, 77.68 percent; sulphur, 0.52 percent; and calories per kilo, 8.288.

All coal and kindling used were weighed. The meals were served at 8:00 a. m., 12:30 p. m. and 6:00 p. m. The stove drafts were closed when cooking was not in progress.

The range used was of medium price and in excellent condition. Difficulty was experienced in keeping uniform temperatures for baking. The oven thermometer provided with the range was found to be inaccurate, so a chemical thermometer in a metal case was placed in the oven. Heat was, however, lost in opening the oven door to read this thermometer.

While using the range the room temperature was greatly raised, a thermometer in an adjoining room without range fire registering 17°C in the morning when this kitchen showed 28½°C. In the afternoon, during bread baking, the temperatures of the two rooms were 22° and 35° respectively. On days when the range was not in use no greater difference than one degree was observed in the temperatures of the two rooms.

It should be noted that while the fire was maintained for cooking purposes for eleven hours, during the first three hours of use 12⅛ pounds or 37.3 percent of the total fuel consumed, was used, although by far the largest amount of cooking was done after this time. From this it would appear that the amount of fuel used in building the fire was out of proportion to the amount used later.

In further substantiation of this point another test was made, using the same menu as before. One hour was required to heat the oven to baking temperature, and while this appears excessive, repeated experiments gave similar results, unless a large amount of oil and wood was used as kindling.

While there was much heat wasted by diffusion and radiation into the room, and by draft into the chimney, there was considerable stove space which might have been utilized had there been more food to be prepared. Moreover, with the coal range there is the utilization of heat otherwise wanted in heating the water supply of the house.

The quality of the food prepared was uniformly good, but the process may be characterized as hard, since constant watching was necessary in order to control, even roughly, the temperature, while the rise in room temperature made the work unpleasant.

The cost of the range and utensils necessary for cooking the articles specified was estimated as approximately $48.74.

Tests with Gas.—These tests were with coal gas, which was measured by means of a standard meter. A range, having three medium burners, one large burner and one simmering burner, also a large oven with broiler underneath, was used.

The time required to consume one cubic foot of gas by the various burners turned on at full capacity at ordinary pressure was as follows: Large burner, 2⅛ min.; medium burner, 3½ min.; simmering burner, 16 min.; one oven burner, 3 min., and both oven burners, 1½ min.

Fifteen minutes were required using both oven burners at full capacity to raise the temperature of the oven from 25° to 225°C, consuming thereby 10 cu. ft. of gas. By means of a chemical thermometer suspended through the top of the oven, temperature readings could be taken without opening the door. Owing to loose construction and imperfect insulation, there was a considerable radiation of heat, causing a rise of 4°C in the temperature

of the room near the range. Since the range was hooded there was no evidence of the presence of combustion products.

The total amount of gas consumed during the day, 147.32 cu. ft., may seem an excessive amount, but it should be remembered that the meals prepared do not represent an average daily consumption of gas, since an unusual amount of baking was done. Furthermore, it should be stated that 124.92 cu. ft. or 84.7 percent of the total amount of gas consumed was used in heating the oven. It would appear then of great importance that ovens be so constructed that a higher percentage of the heat generated might be conserved, and, in consequence, the amount required to maintain the high temperature be reduced to the minimum.

The use of gas as fuel was satisfactory from the standpoint of ease of manipulation, control of the rate of combustion, and quality of the food. While considerable heat was lost by diffusion the rise in room temperature was not sufficient to be oppressive, although the fact that the range was hooded may be in part responsible for this condition.

The estimated cost of equipment and utensils was $33.99.

Tests with Electricity.—The apparatus used for this experiment was made up of the following pieces:

(a) An oven having the heating element inbedded in the plates of the top and bottom of the oven. The oven was well insulated there being little heat radiated from it. For convenience a door with double glass pane was substituted for the metal door provided, and a small incandescent lamp was put inside the oven, making it possible to observe the baking processes without opening the door. A chemical thermometer inserted through the top of the oven made it possible to note the temperature of the oven without opening the door.

(b) A stove, or hot plate, consisting of a cast iron disk, 6 inches in diameter, having the heating element embedded in a non-conducting compound, directly under the plate.

(c) A stove, similar in construction to the one just described, equipped with a double boiler, having an earthenware inner kettle. The double boiler locked to the stove, securing the close contact. The switch was so arranged that the amount of current used could be regulated three degrees: low, medium and high being available.

(d) A coffee percolator, having the heating element inside the base.

(e) A broiler of fluted cast iron. This has three heats, as in (c).

(f) A combination water heater, steamer and double boiler, having the heating element inside the base, as in the percolator. This has three heats.

Considerable time was required and energy expended in heating the apparatus before cooking processes began, especially in the case of the oven, which required from 30 to 35 minutes to reach a temperature of 225°C. Here as in the experiment with gas, a high percentage of the total energy required (in this case 78.9%) was used in oven cooking. All the apparatus seemed to hold the heat well, it being possible to turn off the current from five to ten minutes be fore the cooking was completed.

Much has been said in articles written with a view toward popularizing the adoption of electricity for cooking, concerning "the excellence of engineering design" and "great ingenuity" displayed in the construction of electrical cooking utensils. Although the utensils used in these experiments were selected as the best types obtainable they were uniformly heavy and hard to handle, one piece, the broiler, weighing 12.5 pounds. The lower part of the double boiler was evidently constructed with no regard to the fact that it would some day require washing, and its earthenware inner kettle, while attractive in appearance, was suitable for cooking only at a very low temperature, since its contents could not be raised above 80° C. even by prolonged heating. The seams of the water heater were not water tight, outside, and in washing, water gained entrance to the heat coils, causing some trouble. Closeness of contact seems absolutely necessary in order to secure any great amount of efficiency, so stoves with specially constructed kettles which lock upon them seemed most satisfactory.

The results obtained from cooking by means of electricity were uniformly good, the temperature being remarkably even, and easily maintained. Since there is no flame, smoke, soot or ashes, there is a great saving in labor, no vitiation of the atmosphere and no appreciable rise in room temperature. The voltage used is low, 110 volts being usually employed, so there is little dange from shock.

The cost of installation and utensils is estimated as $115.27.

It is here apparent that the cost of utensils necessary for electrical cooking is extremely high, being almost prohibitive to families of moderate means. An added cost is probable in installing wiring of sufficient strength to carry safely the current required for a cooking circuit.

Discussion of results.—A comparison of the results as shown in the data may now be made.

In regard to the time of cooking the following results are noted:

COMPARATIVE TIME REQUIRED FOR COOKING WITH COAL GAS, AND ELECTRICITY.

Article.	Coal.	Gas.	Electricity.
Breakfast—	*Min.*	*Min.*	*Min.*
Cereal	70	65	81.5
Bacon	7	7	9
Biscuits and apples	71	35	70
Coffee	7	13	15
Total	*a*	120	175.5
Lunch—			
Sponge cake	55	52	65.75
Croquettes	30	15	34
Peas	15	2.25	11
Cocoa	40	8	41.5
Rolls	14	30	49
Total	*a*	107.35	201.25
Dinner—			
Bread	45	67	70
Roast	100	87	144.25
Coffee	7	13	15
Dressing	8	8	20
Soup	30	30	44.5
Total	*a*	205	293.75
Total		430	670.5

In attempting to draw general conclusions from these data, a number of factors must be borne in mind. The time of cooking as tabulated is estimated from the time the first heat is generated until its use is discontinued except that in the case of the coal range, in which a fire was maintained throughout the day, only the breakfast data could be so computed, and the figures recorded for the later operations represent the time during which the article to be cooked was in or on the stove. Therefore, the coal data, as regards specific time of cooking, are not comparable with those

*a*Not computed. See explanation below.

of either gas or electricity. It should also be noted that the total time recorded above is made up, in the gas and electricity data, by the addition of the time required to cook each separate article, even though several things were in process of cooking at the same time.

Similar tables might be compiled pointing out in detail the comparative amounts of fuel used, and the cost of each operation. Instead it has been thought better to combine the results in tabulated form as follows:

COMPARATIVE ECONOMY IN COOKING WITH COAL, GAS AND ELECTRICITY.

	COAL.			GAS.			ELECTRICITY.		
	Time.	Amount of Fuel.	Cost.	Time.	Amount of Fuel.	Cost.	Time.	Amount of Fuel.	Cost.
	Min.	*Lbs*	*Cts.*	*Min.*	*Cu. Ft.*	*Cts.*	*Min.*	*Watt-hours.*	*Cts.*
Breakfast	*a*	12.125	3.03	120	32.3	4.03	175.5	2295.6	11.48
Lunch ...	*a*	6.625	1.65	107.35	43.43	5.42	201.25	2683.45	13.42
Dinner ...	*a*	13.75	3.44	205	71.59	8.94	293.75	5028.475	25.14
Total ...	663	32.50	8.13	432.35	147.32	18.39	670.5	10007.6	50.00

*a*For the reasons explained above no estimate is attempted of the time required for the separate meals. The total figure represents the entire time intervening from the lighting of the fire in the morning till the completion of the cooking.

From this table it is concluded that electricity requires slightly more time than coal for the same operation, and both require approximately one and one half times as long as was needed with gas.

As regards available efficiency for cooking, 32.5 pounds of coal equals 147.32 cu. ft. of gas and 10,007.6 watt hours of electricity. Considered from the standpoint of cost, gas at $1.25 per 1000 cu. ft. is 2.26 times as expensive as coal at $5.00 a ton. Electricity at 5 cts. per watt hour is 6.16 times as expensive as coal, and 2.72 times as expensive as gas. At these same prices, therefore, $1.00 invested in coal would provide for the same amount of cooking as $2.26 invested in gas, or as $6.16 invested in electrical current.[b]

*b*In attempting a comparison of the results reported in this paper with those recorded in that of Miss Terrill, immediately preceding, the difference in local conditions as to price, etc., should be carefully considered. See also p. 399.

CAKE MIXING.

MABEL T. WELLMAN.

A special class at the University of Chicago began some work on cake which started three of us to further experimentation for a quarter of the year, and finally left me to a quarter's work by myself. Our method was to use exact weighed amounts of ingredients. We used the standard three cups of flour recipe, usually making one-fourth amounts, but occasionally repeating with the full amount as a check on results. The cakes were all baked in gas ovens with thermometers inserted so that we controlled temperatures exactly.

A number of interesting results were obtained. First, we found that none of our utensils were standard or even uniform as measures. The average weight of whites and yolks of eggs we found as 30 and 20 gms. respectively, values which are of course well within the range on which the average data usually quoted are based. We also found that a cup of flour once-sifted might vary considerably in weight with the same person in repeated fillings, and easily 25 gms. when different people filled it. Of course, sifted and unsifted flour varied greatly, but there was not much lessening of the weight after the second sifting. The difference we found here suggested possible explanations of varying results with the same recipe in the hands of even fairly careful individuals.

As a result of much weighing we adopted the following table of weight which was used during the second and third quarters' work:

KITCHEN MEASURES EXPRESSED IN GRAMS.

Measure	Gms.	Measure	Gms.
1 cup of water	237	1 cup of flour (Swansdown)	100
1 " " milk	244	1 egg white	30
1 " " sugar	210	1 egg yolk	20
1 " " butter	227	1 teaspoon baking powder	3
1 " " flour (pastry)	100	1 " cream of tartar	3.5

The oven temperature adopted as a standard was 195°C

Much that we did requires further experimentation before conclusive results can be obtained, especially on the question of varying proportions. In some of the problems of mixing, however, we felt reasonably sure of results. We found that while the cake was not so good if the butter and sugar were not thor-

oughly creamed, that *in every case except in making pound cake*, the butter could be *melted* and beaten in before adding the white of egg. We would mix a cake, for example, in the following order: Take 1½ cups of sugar beaten into the yolks of four eggs; 3 cups of flour with 3 teaspoonsful of baking powder added alternately with ¾ cup of milk; ¾ cup of melted butter beaten in thoroughly; and the beaten whites of 4 eggs. Sometimes we dissolved part of the sugar in the milk. If only yolks were used, we kept the same order, adding the butter last.

Cakes mixed in this way and baked beside cakes of the same proportions mixed in the conventional manner could not be told apart in appearance or taste after baking, although the batter differed in appearance before baking.

Some further work made us believe that the whole question is one of getting the ingredients thoroughly mixed. The difficulty of putting everything in together before stirring seems to lie in this. One can see particles of egg in the baked result. Pound cake contains so little liquid—practically none except the egg—that possibly this accounts for the failure to succeed with melted butter.

Some further work done at the university does not accord with Miss Watson's work as recently reported.[a] Repeated experiments showed that melted butter could be used in mixing baking powder biscuits if due care was used to beat it in thoroughly; and such biscuit compared favorably both in texture and tenderness.

It is somewhat difficult to measure exactly the time saved by using melted butter in cake instead of creaming the butter with the sugar, for the time necessary for that process varies with the season, and with the amounts used; but it was found, on the average, to save half of the time consumed in mixing.

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[a] Ann. Rpt. Ontario Agl. Col. and Expt. Farm, 33, (1907), p. 244; abs. in U. S. Dept. Agr. Farmers' Bul. 360, p. 32.

THE CHRISTMAS PLUM PUDDING.

An English authority has recently stated that plum pudding is not the deadly combination it is commonly thought to be, but that it is a concentrated food containing both protein, fat and carbohydrates in abundance and so more fitted to serve as a meal than to be crowded in at the end of a hearty dinner. In other words, it is harmful because wrongly used rather than because of any inherent qualities. Commenting on this, G. K. Chesterton, says in a recent issue of the *Illustrated London News*:

"The doctors have now discovered that Christmas pudding is an exquisitely hygienic and harmless food. That is typical of all the developments of scientific thought in our day. Many prophets and righteous men, many thinkers and idealists, have wasted their lives in running after scientific truth. Never run after scientific truth. Stand where you are, and in a few years scientific truth will run after you. Continue to eat pork, and sooner or later the doctors will say that pork is the only food that is perfectly digestible. Continue to drink port, and sooner or later a man will arise in medical circles who will prove that port is the only certain safeguard against gout. The specialist may have told you to take your children to the seaside, but if you are only long enough in packing he will very likely have discovered that sea air is poison before you start. The best authorities may have told you (if your chest is weak) to make your bed in your back garden for a year. They may be telling you to grow tulips in your bedroom the next year. In fact, I did definitely see in a medical article the other day that the fresh-air cure ought to be given up, as fresh air was not so good a thing as had been supposed. The truth of the matter is, I suppose, that what a medical theorist has to do is almost exactly the same as what a social or historical theorist has to do; he has to strike an average between an enormous number of effects produced by one thing, all of them different effects, some of them contradictory effects. It is as difficult (I expect) to say whether the effect of sherry is good or bad as to say whether the effect of Napoleon was good or bad. Among these ordinary human things there is no such thing as the simple poison and the simple antidote. Napoleon was not a poison; he was a dangerous stimulant. Wellington was not an antidote; he was a very dangerous substitute."

WILLIAM STITH, AN EARLY AMERICAN STUDENT OF NUTRITION.

Among earlier American articles on nutrition the inaugural dissertation on digestion by William Stith of Virginia, who was graduated from the Medical Department of the University of Pennsylvania in 1821, deserves mention. Stith discusses digestion, the digestive apparatus, hunger and thirst, mastication and salivary solution, deglutition, digestion in the stomach, digestion in the duodenum, and the action of the small intestines.

His paper may be assumed to represent fairly the opinions which were generally held at the time he wrote. So far as can be learned his dissertation was never published. Through the courtesy of the University of Pennsylvania it has been possible to examine the original manuscript and make transcriptions. As yet it has not been possible to obtain additional biographical data regarding Dr. Stith.

The title page reads as follows:

"An Inaugural Dissertation on Digestion, Wm. Stith, Virginia.

Admitted March 16th, 1821."

The introductory sections of the dissertation and quotations from the section on digestion in the stomach follow.

of digestion.

By the term digestion we are to understand that function of assimilation, by which the various changes are produced, which extraneous substances undergo, when subjected to the action of the digestive apparatus; producing a compound eminently subservient to the growth and nourishment of the body. Owing to the changes of composition and decomposition that are continually going on in all living bodies, a disunion of their elements, an alteration and decomposition of the whole mass, constituting the body, would necessarily ensue, if not prevented through the medium of assimilation, which, consisting of the changes that the food undergoes when taken into the digestive

system, or digestion and chylification, of the changes that are wrought on the nutritive fluid, during its circulation through the body, or in other words, languification and secretion, and also of the lodgement and removal of its particles in almost every part of the body, constituting what are called nutrition and absorption, serves the purpose of reproduction. This internal motion takes place to such a degree that the animal machine is entirely renewed in the course of several years. Experiments have been made by physiologists tending to ascertain the exact period, at which this renewal happens. Some have supposed that it happens at the expiration of seven years; some in three years, and others have even gone so far as to assert that it takes place in the short space of fifty days; but these calculations are liable to great uncertainties and almost insuperable objections, occasioned by the different degrees of health, sickness, age, temperament, etc. Owing to this entire renovation, the human body has been very ingeniously compared to the famous ship, Argo, which, after her long and perilous voyage, contained not a particle of her original "materials."

OF DIGESTION IN THE STOMACH.

"The aliment, after having received the impression of mastication and the saliva, is accumulated in the stomach; there to be influenced by changes still more important than those hitherto noticed; but what these changes are, is yet undecided.

"Before I proceed to speak of the processes, which are now generally supposed to effect digestion in the stomach, it may not be improper to mention the various theories, that have been advanced on the subject. * * *

"Concoction is the first theory that was advanced to explain the phenomena of digestion. It is the theory of the ancients; but they did not mean by the term, to signify that heat is the sole cause of digestion; but that it is the principal agent; as the word itself imports. Certain it is that heat is essentially necessary to the due performance of digestion. This is shown by the experiments of Spallanzani, which prove, that the gastric juice, one of the principal agents of digestion, has no more effect than common water in dissolving alimentary substances, when the temperature is below twenty-one degrees of Fahrenheit's thermometer; but on the contrary, that its activity

is considerably increased, when the temperature is raised to thirty two degrees above the freezing point. Mr. John Hunter thinks that heat is not the immediate, but the remote cause of digestion; producing in the animal an increased activity of all its functions. Dr. Jenner speaks to the same purpose. * * *

The next theory is Fermentation, which was invented by the chemists, who prosecuted it with such zeal, that at one time it was generally adopted; but in the present reformed state of our science it has fallen into disrepute. The principal argument, on which it rests, is, that only those substances afford nourishment, which are capable of undergoing the process of fermentation. * * * It would seem that digestion and fermentation are directly opposed to each other, the one having for its object the nourishment and preservation of the body, whereas the other tends continually to its destruction.

"The next theory that attracts our attention is Trituration. This is the invention of the mechanical philosophers, who, reasoning from false analogy, compared the changes which the food undergoes in the gizzard of the fowl to those wrought by the stomach; but the comparison is extermely improper, since the one viz., the gizzard is really the organ of mastication, and the other that of digestion. Drs. Stevens and Spallanzani performed experiments tending to prove that digestion is effected independently of trituration. To effect this purpose the one caused to be swallowed, and the other himself swallowed, small tubes containing digestible articles, when on examination, after they were expelled from the stomach, they were found to have undergone digestion. Moreover, it is sufficiently known, that certain substances, as the seeds of various vegetables, etc., frequently pass through the digestive system without being triturated or even materially altered.

"Maceration is another theory that was proposed to explain the phenomena of digestion. It was the opinion of the illustrious Haller that the aliment in the stomach undergoes a slow degree of maceration, and that this is effected partly by the gastric juice, and partly by other secondary causes. The four-fold stomach of certain animals at first view appears to add great plausibility to this hypothesis, but by further examination we shall be led to believe that this structure is intended merely to detain the food for the purpose of producing some changes,

similar to maceration, preparatory to the real digestive process. * * * Maceration is inadequate to the product of digestion, since it only softens and dissolves the alimentary mass without effecting any new compounds.

"All these hypotheses being abandoned as insufficient to account for the phenomena of digestion, it was necessary that some other should be proposed; accordingly we find that the attention of physiologists was directed more particularly to the investigation of the gastric juice. This fluid, so curious and interesting in its properties, is secreted by the exhalent arteries ramifying on the internal surface of the stomach.

"Its nature has been a matter of much dispute among physiologists. Some have supposed it to be acid, and some alkaline; while others have believed it to be exclusively acid in some, and alkaline in other animals; but we are led by the experiments of Spallanzani, J. Hunter, and Dumas, to infer that it is neither exclusively acid nor alkaline in different animals, but nearly the same in all, though, from the result of some of their experiments, they seem to think that it may be altered according to the nature and quality of the food on which the animal may feed. Thus they found that when vegetables were used it was decidedly acid, and on the contrary, when animal flesh was used, it exhibited alkaline properties.

"It is powerfully antiseptic; so much so that if substances in a state of putrefaction be taken into the stomach, that process will sometimes be entirely suspended; though Mr. Hunter denies that it possesses any such property; but says, that substances, when subjected to its action, are made to go through another process; thereby preventing their spontaneous changes from taking place.

"The most important and interesting property of the gastric juice is its powerfully solvent quality. It is so powerful, that even the hardest substances can scarcely resist its action. It is truly astonishing to see its effects in some animals. In the dog, for instance, it dissolves, without difficulty, the hardest bones on which this animal sometimes feeds. Howsoever powerful the solvent quality of the gastric juice may be, it does not act on the stomach whilst vitality remains; but as soon as that departs, so soon does the stomach, then like other dead matter, yield to its influence.

"The gastric juice in its effects has been compared to galvanism, and the parieties of the stomach to a galvanic battery; but all these experiments, and the opinions deduced from them must be greatly deficient, since they are performed independently of vitality, which, by its powerful influence produces effects that could not otherwise be produced. If it should be asked, why is digestion promoted by the application of galvanism to the stomach? it might be answered, that it does not produce this effect, from an identity of operation to the gastric fluid; but simply, like other stimulants, by increasing the activity of the stomach.

"The present and most popular theory of digestion in the stomach ascribes it principally to a solution of the aliments by the gastric juice; by which thc materials of the aliment are decomposed,and new compounds are formed,possessing properties totally different from the original. The changes which are produced by the gastric juice are probably purely chemical; though the stomach cannot be considered as a vessel in which digestion is performed solely by chemical means; if so the product of digestion could be artificially obtained; but, on the contrary, it must be considered as a highly complicated function, dependent on several other auxiliary causes, such as animal heat, an internal motion of the aliment, somewhat resembling fermentation, but being probably very different, the gradual contraction of the muscular fibres of the stomach, etc. The digestive process may,therefore, be said to consist of vital, chemical, and mechanical causes. Dr. Fordyce denies that any chemical effect is produced on the aliment by the gastric juice; but thinks that the alimentary substances, which have in themselves all the elements of chyle, are, by the action of the stomach and other organs of digestion, decomposed and recombined in the form of a new substance. Whatever the action of the gastric juice may be, in producing digestion, certain it is that it has a tendency to coagulate alimentary substances. Accordingly we find that the first change, which the food generally undergoes in the stomach, is coagulation.

"This takes place so uniformly that it would seem as if it were necessarily preparatory to digestion; nevertheless this process does not universally take place; water and alcohol, for instance, do not coagulate; but previously to the passage of the food out

of the stomach, this coagulation is dissolved to form that soft pultacious mass denominated chyme. The whole mass of food is not digested at the same time, but only that part which is in contact with the stomach. This part after having been converted into chyme, is, by the motion of the stomach, forced through the pylorus, when another stratum of the aliment comes in contact with the parietes of the stomach to be effected in like manner. Thus digestion proceeds from the circumference to the centre. The aliment remains in the stomach a longer or shorter time, according as it is more or less digestible; not a particle of it being suffered to escape unless thoroughly digested.

"This office of preventing the passage of indigestible matter from the stomach is performed by the pylorus, which by its tender and elective sensibility yields only to the impression of the homogeneous chyme, to which by habit it has become perfectly accustomed; unless some indigestible substance be swallowed, which, by repeatedly coming in contact with the pylorus accustoms it to its impression, and thus a passage is afforded. While digestion is going on in the stomach, if it be perfect, both of its orifices are accurately shut. There is also at this time an increased activity of the stomach, caused by the metastasis of the vital power, deserting partially the other parts of the body to concentrate itself in that which is the seat of the digestive process. In this manner we may be able to explain the cause of the deaths which so frequently happen in convalescents, who indulge themselves in eating articles of a nature too indigestible to yield to the feeble powers of their systems; by which so considerable a portion of vitality, deserting the other parts of the body to pass to the stomach, leaves them in such a debilitated condition that it is beyond their power to react, and death follows as a necessary consequence. In this manner we may also explain why digestion is better performed in a state of rest than in a state of activity. If exercise be taken, that power which would otherwise be concentrated in the stomach for the purpose of increasing the activity of digestion, will be allotted to other organs for the discharge of their respective functions, and consequently digestion will not be so perfectly performed as it would, had not this power been thus distributed. On the same principle we may also account for the drowsiness which is generally felt a short time after meals. In the commencement of digestion a slight chill is generally perceived; the pulse becomes quicker and

harder; the stomach begins to act; its fibres at first irregularly, but after a short time regularly. Those which are circular commence their contractions at the cardia and proceed to the pylorus; whilst those which are longitudinal act so as to approximate its two extremities; by which means the angle formed at the pylorus is somewhat overcome, thereby facilitating the passage of the food into the duodenum. It has been ascertained that digestion is better performed during sleep, when we lie on our right than on our left side. The cause of this has been attributed to the weight of the liver, pressing on the stomach when the left side is down.

"But this mechanical theory is a very unsatisfactory one. Might it not be much better explained by attributing it to an easier passage of the food through the pylorus when we lie on the right side? As the stomach empties itself the chill goes off and is succeeded by a degree of warmth, which increases the perspiration; an effect then is produced somewhat similar to a paroxysm of fever. Digestion is considerably influenced by nervous action. If the eighth pair of nerves be tied or cut, digestion will be either imperfectly performed, or entirely suspended. Majendie of Paris thinks that the tying or cutting of the eighth pair of nerves does not influence digestion by acting immediately on the stomach but by suspending the function of the lungs. To evince this, he cut the eighth pair of nerves below the branch which supplies the lungs; when the result was that digestion was not materially interrupted; but on the contrary, when the same nerve was divided above the branch which goes to the lungs, that digestion was entirely suspended. Passions of the mind, narcotic substances, or anything lessening the excitability of the stomach produce an effect somewhat similar."

In the remainder of his paper Dr. Stith discusses digestion in the duodenum and other phases of digestion. The quotations given are sufficient to show how he treats his subject.

That the University of Pennsylvania medical department paid considerable attention to nutrition in the earlier part of the nineteenth century is evident from an examination of the published list of titles of dissertations. The work of Stith, and of Caleb Tichnor and John R. Young which has been quoted at length in the earlier numbers of this JOURNAL, shows that this work was of high grade and real value.

THE PROGRESS OF SANITATION WITH SPECIAL REFERENCE TO THE INFLUENCE OF PURE WATER AND AIR UPON THE HEALTH OF COMMUNITIES.

By Geo. M. Kober, M.D., LL.D.

Professor of Hygiene, School of Medicine, Georgetown University.

Professor Finkelnburg of Bonn estimated some years ago that the average length of human life in the sixteenth century was only between eighteen and twenty years. At the close of the eighteenth century it was a little over thirty years, while today it varies in different countries from less than twenty-five to more than fifty years. Longevity goes hand in hand with improved sanitation; the span of life since 1880 has been lengthened in civilized countries fully six years.

No two factors have contributed so much to the general results as the improvement of the air we breathe and the water we drink. We have ample evidence that with the introduction of public water supplies and sewers the general mortality in numerous cities during the past fifty years has been reduced fully one-half, the good effects being especially shown by a marked decrease in the number of deaths from typhoid fever, diarrheal diseases and consumption. The vital statistics of Great Britain furnish the proof and our experience with German and American cities confirms this conclusion.

The death rate in the city of Berlin has been reduced from 32.9 per 1000 in 1875 to 16.4 in 1904; in Munich from 41.6 in 1871 to 18 in 1906, and in Washington from 28.08 in 1875 to 19.25 in 1907.

The death rate in the city of New York in 1804 was 28 per 1,000; from 1850 to 1854 it was 38 per 1,000; while in 1906 in spite of the density of population it was 18.9 per 1,000, practically a reduction of 50 per cent, which according to Walter F. Wilcox[a] of Cornell University, means a saving of something like 46,000 lives each year in that city alone.

The mortality in the registration area in the Uinted States has been reduced since 1890 from 19.6 to 16.2 per 1,000 in 1905. which means a saving of over 290,000 lives a year.

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[a]Monthly Bulletin N. Y. State Dept. of Health, March, 1908.

It has long since been known that rivers are always purer near their source; the amount of impurities increases as we descend the stream, since the water courses are the natural drainage channels of the country and the wastes of human life and occupations find their way into the streams. It is also well known that our large American rivers are the sewers and at the same time the source of water supply for nearly all the cities located on their banks. These cities show, moreover, a marked prevalence of typhoid fever, thus confirming what has been observed over and over again, that this disease, as also cholera, dysentery and diarrhoeal diseases can be carried from one town or city to another by means of inland waterways. The question is one of extreme interest even to the residents along the Great Lakes; we know that large cities like Buffalo, Erie, Cleveland, Detroit, and Milwaukee discharge their sewage into the Lakes, and we also know how Chicago and Cleveland suffered from typhoid fever visitations by contaminating their own water supplies. It is also a well-known fact that many of the river cities were obliged to resort to purification of their water supplies in order to arrest the ever increasing typhoid fever wave.

Influence of Water Supplies upon Typhoid Fever Death Rates.—For the purpose of determining the influence of public water supplies on the typhoid fever death-rates in general, Mr. M. O. Leighton, Chief of the Water Resources Branch of the U. S. Geological Survey, very courteously complied with my request for a list of the principal American cities with a population of over 30,000 classified according to their water supply. Dr. Cressy L. Wilbur, Chief Statistician of Vital Statistics, Bureau of the Census, with equal promptness and accuracy has computed the mean rate (not the average annual rate, which, however, differs only slightly for the five years 1902 to 1906), and has arranged them in a chart, a summary of which is as follows:

MEAN TYPHOID FEVER DEATH RATE FROM 1902 TO 1906.

	Ratio per 100,000 of population.
4 Cities using ground water from large wells	18.1
18 Cities using impounded and conserved rivers or streams	18.5
8 Cities using water from small protected lakes	19.3
7 Cities using water from the Great Lakes	32.8
5 Cities using both surface and underground water	45.7
19 Cities using polluted river water	61.1

The Hygienic Value of Pure Water: Annual Cost of Typhoid Fever in the United States.—According to the Census of 1900 there were 35,379 deaths from typhoid fever during the census year throughout the United States; and based on an estimated mortality of 10 per cent it is within reason to assume a yearly prevalence of 353,790 cases of this disease. If we calculate the average cost for care, treatment and loss of work to be $300 and the average value of a human life at $5,000 we have a total loss in the United States of $283,032,000 from one of the so-called preventable diseases. Mr. George C. Whipple[a] presents some striking evidence to indicate that a loss of $10,000 for every death from typhoid fever is a conservative estimate, in which case the decrease in the "vital assets" during the census year of 1900, would amount to $353,790,000. Reduce the prevalence of the disease one half (which has been accomplished in parts of Europe and our own country), and the question of the hygienic value of pure water will be answered.

The Effect of Improved Water Supply on Typhoid Fever Death Rates.—The writer at the White House Conference presented charts prepared by Dr. Wilbur showing the general movement of typhoid fever in fourteen countries and cities since 1881, indicating that the death rate from this disease has fallen from an average of 42.3 to 18.1 per 100,000, a reduction of 54.3 per cent.

He also presented a chart showing the effect of change in water supply in seven American cities viz., Lawrence, Lowell, Newark, Jersey City, Paterson, Albany and Binghamton. From this study we learn that the combined average annual death rate from typhoid fever in cities with a contaminated supply was 69.4 and that after the substitution of a pure supply it fell to 19.8 per 100,000; a reduction of 70.5 per cent.

The Bulletin for the month of April, 1908, of the New York State Department of Health contains an interesting article showing that the death rate from typhoid fever in ten cities of that State has been reduced 53.4 per cent by improved water supplies.

It may be urged that improved methods of medical treatment are responsible for a considerable reduction in the death rates from typhoid fever, but when we see such a striking change immediately after the installation of filtration plants as in the

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[a]The Value of Pure Water, New York, 1905, p. 5.

case of Albany, Lawrence, and also more recently in Cincinnati and Philadelphia, we are forced to the conclusion that water purification plays the most important role by diminishing primarily the number of cases. It should be stated, however, that the effects are still more marked when combined with a good system of sewerage. The history of every sewered town shows a lessening of the typhoid death rate and that the typhoid rate is always higher in sections of the same city supplied with makeshifts. The writer in 1895 pointed out that typhoid fever prevailed in Washington in the rate of 1 to 81 of houses supplied with privies, and only 1 in 149 of those connected with sewers, and offered as the only reasonable explanation, that the sewers carry away the filth and germs that otherwise would contaminate the soil and ground water. Even if there were no wells these makeshifts are still a source of danger in so far as they favor the transmission of the infection by means of flies[a], nor can the possibility be ignored that the germs in leaky and overflowing boxes may reach the upper layer of the soil and with pulverized dust gain access to the system.

The writer believes that about 80 per cent of the cases of typhoid fever are water and milk-borne and that about 20 per cent may be spread through the agency of flies, personal contact, the consumption of raw oysters and shell fish raised in sewage polluted waters, or the eating of strawberries, radishes, celery, lettuce and other vegetables and fruits which have been contaminated with infected night soil.

Other Water-Borne Diseases.—What has been said of typhoid fever is equally true of other water-borne diseases like cholera, dysentery, cholera morbus, diarrhoeal diseases and the transmission of the eggs of intestinal and other parasites, because the germs of eggs of these diseases are present in the intestinal tract and presumably also in sewage contaminated water. Mr. Allen Hazen,[b] one of the most distinguished experts on water purification in America, has conclusively shown that as the result of filtration plants in five cities supplied previously with an impure water, there was not only a reduction of 81 per cent in the deaths from typhoid fever, but also a marked reduction in the general

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[a]The agency of flies in the transmission of typhoid fever germs was first pointed out by the writer in the Report of the Health Officer of the District of Columbia in 1895.

[b]See paper read at the International Engineers' Congress at St. Louis in 1904.

death rate. His computations clearly indicate that where one death from typhoid fever has been avoided by the use of a better water, a certain number of deaths, probably two or three from other causes, have been avoided. The truth of Hazen's theorem has recently been confirmed by Prof. Sedgwick. It is a difficult matter to explain how water is connected with the deaths other than those from water-borne diseases, yet when we consider that water enters into the composition of the human body to the extent of 60 per cent we are in a position to appreciate the sanitary acumen of Aristotle when he wrote in his Politica: "The greatest influence on health is exerted by those things which we most freely and frequently require for our existence, and this is especially true of water and air."

The importance of the subject is generally appreciated and the North American Conservation Conference on February 23, 1909, in the declaration of principles, adopted the following in reference to public health.

"Believing that the conservation movement tends strongly to develop national efficiency in the highest possible degree in our respective countries, we recognize that to accomplish such an object with success, the maintenance and improvement of public health is a first essential.

"In all steps for the utilization of natural resources considerations of public health should always be kept in view.

"Facts which cannot be questioned demonstrate that immediate action is necessary to prevent further pollution, mainly by sewage, of the lakes, rivers and streams throughout North America. Such pollution, aside from the enormous loss in fertilizing elements entailed thereby, is an immediate and continuous danger to public health, to the health of animals, and when caused by certain chemical agents, to agriculture. Therefore, we recommend that preventive legislation be enacted."

Having studied the effects of pure water supplies upon mortality rates let us next consider the influence of pure air, removal of dampness and of general sanitation upon tuberculosis.

The Influence of Sewers in the Prevalence of Tuberculosis.—The records of the Health Office of the City of Washington show that during the past thirty years 14.5 per cent of all the deaths occurring in the District of Columbia have been caused by pulmonary tuberculosis. The death rate, however, has gradually

and constantly fallen from 440 per 100,000 in 1880 to 210 in 1907. The death rate from this disease in New York City has fallen in like manner from 355.6 to 271, in the United States at large from 326.2 in 1880 to 183.6 in 1907, in England and Wales from 348.7 in 1850 to 172.2 in 1906, and in Massachusetts during the same period from 469.2 to 218.3. These reductions began long before the combat of the disease was a subject for popular education. The question naturally arises, if these reductions have resulted independent of any attempt to control the source of infections, what are the chief factors concerned in bringing about this gratifying result? In considering the question, I know of no sanitary reforms which could have exerted a greater influence upon our general well-being than the introduction of sewers, improved water supplies and the erection of sanitary homes. The marked reduction in the prevalence of consumption after the introduction of sewers observed in England over forty years ago, and also in the cities of Washington and New York and the country at large, may to a great extent be attributed to the prevention of air pollution and dampness. It is noteworthy that while the reduction in Washington coincident with the introduction of sewers amounts to 37.3 per cent the reduction in Baltimore, an unsewered city, is only 24. per cent. It has been estimated by Erismann that a cess-pool with 18 cm. contents is capable of polluting the atmosphere in the course of twenty-four hours with 18.79 cm. of impure gas, composed of carbonic acid, ammonia, sulphuretted and carburetted hydrogen and volatile fatty acids. In view of this fact it requires no great stretch of the imagination to calculate the amount of air pollution which resulted from the 30,000 cesspools and other makeshifts prior to the introduction of the sewerage system in the city of Washington. The influence of impure air upon our physical well-being and the powers of resistance cannot be under-rated. As a matter of fact, individuals who contract tuberculosis in cities often arrest the disease by removal to the country, showing that an abundance of pure air is a very important factor in the treatment of the disease, simply because it promotes oxygenation of the blood, stimulates the appetite and nutrition and thereby increases the general resisting power of the system. There can be no doubt as to the curative virtues of pure air, and hence we ought not to under-rate its preventive properties.

The importance of a dry, healthful building site was appreciated by Hippocrates, since he as well as Vitruvius, the father of architecture, referred in their writings to elevation as a desirable factor. One of the most striking illustrations of damp habitation as a predisposing cause to consumption has been recorded by Nowak, in the case of a prison in the vicinity of Vienna, containing on an average 200 inmates. Every convict is examined before his transport, and if found affected with incipient tuberculosis he is sent elsewhere. In spite of this precaution the deaths number about 50 per annum and the majority die from consumption. The prisoners are better fed in this institution than elsewhere, but the building rests on a wet soil, the walls reeking with moisture, and the rooms smell musty.

The relation of dampness to consumption may be explained as follows: Dampness of soil, unless special precautions have been taken, extends by capillary attraction to the walls and renders the entire house damp. Damp air abstracts an undue amount of animal heat, lowers the power of resistance of the inmates and predisposes to catarrhal affections, and these in turn render the mucous membranes vulnerable to the invasion of the tubercle bacilli. There is also reason for believing that the tubercle bacilli retain their vitality for a greater length of time in such an atmosphere on account of its humidity and excess of organic matter.

At all events it has long been known that tuberculosis is far more prevalent in damp, dark and insanitary houses. The children are anaemic and as puny as plants raised without the stimulating effects of sunlight. The death rate is often double and treble that of other localities. While there are doubtless other factors which determine the frightful mortality, none are more potent than dampness, deficient sunlight and poor ventilation. The tubercle bacillus clinging to floors and walls in carelessly expectorated sputum or droplets would be destroyed by a few hours exposure to sunlight, but finds in damp and dark basements, back-to-back houses, and yards and alley tenements suitable environments for its vitality and growth, and the other insanitary factors alluded to, together with the more intimate contact, materially increase the chances of infection.

If it should appear from the foregoing that the writer believes in the ubiquity of the tubercle bacillus and that the question of

environment should receive first and foremost consideration, he desires to be understood that he is convinced from the splendid labors of Professor Carl Fluegge that the tubercle bacillus is not ubiquitous and hence the task of stamping out the primary sources of infection is by no means a hopeless one.

He believes, however, that, until this is accomplished, in this disease as in other infectious diseases due attention should be given to all the causes likely to influence their spread, so that in our efforts to combat tuberculosis they may receive proper consideration.

We can scarcely do better tnan to conclude our review with the following quotation from the report of the Conservation Commission.

"Since the greatest of our national assets is the health and vigor of the American people, our efficiency must depend on national vitality even more than on the resources of the minerals, lands, forests and waters. The average length of human life in different countries varies from less than 25 to more than 50 years. This span of life is increasing wherever sanitary science and preventive medicine are applied. It may be greatly extended Our annual mortality from tuberculosis is about 150,000. Stopping three-fourths of the loss of life from this cause and from typhoid and other prevalent diseases would increase our average length of life fifteen years. There are constantly about 3,000,000 persons seriously ill in the United States, of whom 500,000 are consumptives. More than half this illness is preventable. If we count the value of each life lost at only $1,700, and reckon the average earning lost by illness at $700 a year for grown men, we find that the economic gain from mitigation of preventable disease in the United States would exceed $1,500,000,000 a year. This gain, or the lengthening and strengthening of life which it measures, can be had through medical investigation and practice, school and factory hygiene, restriction of labor by women and children, the education of the people in both public and private hygiene, and through improving the efficiency of our health service, municipal, state and national."

PAPERS AND DISCUSSION AT THE DENVER MEETINGS.

APPLICATION OF THE HOUSEHOLD ARTS AND SCIENCES TO THE ELEMENTARY SCHOOLS.[a]

Unquestionably the school has drawn the interest of the child from the home, and consequently his sense of responsibility and relationship, developed through the daily cooperation in the family life, is lost.

How may this same agency, the school, be enabled to restore the importance of home and home duties?

One of the suggestions offered is that the school shall build a small dwelling house in the hall, or basement, or yard. A house of three rooms, 7x7 each,—kitchen, bed-room, dining and living room combined, is sufficiently large for the use of children eight to twelve years old. It may be built by the manual training class, in sections of one room each, or secured from one of the firms making portable houses at a cost of $200 to $300.

Equally important is the care of the home and its furnishings. The simply furnished house means less physical exertion but not necessarily less beauty.

Proper clothing and its care is essential to a child's healthy conditions. Habits of cleanliness, neatness and order must be developed in the early years.

It would not be quite practical in this little house to enter into the personal activities of bathing and dressing, so a very large doll approximating the size of the child may be used.

The food problem so fundamental to the welfare of the race must be presented to the child so that he will learn to desire the right kind of food and to have it clean.

"Right Living" goes further and demands, also, the right manner of serving and eating the food.

The home table should be the school of good manners and of good food habits.

If all the foregoing principles have been touched upon through the life in this little house, if the child has been led to see the joy of living through these home activities, she will feel that the real home is hers in which "to do" and will be ready to share its responsibilities.

[a] A synopsis of an address by Ellen H. Richards, delivered before the department of Elementary Education, National Education Association, Denver, Colorado, 1909.

A DISCUSSION OF MRS. RICHARDS' ADDRESS.

In discussing the foregoing address Miss Ednah A. Rich, Principal of the State Normal School of Manual Arts and Home Economics, Santa Barbara, Calif., spoke as follows:

Mrs. Richard's paper is so comprehensive that one hesitates to take away, by discussion, the impression made by the charming word pictures she has given us.

All that the paper has suggested lies within the range of possibility, and those who are now in training are being prepared to present their so called regular school subjects in relation one to another. Not being "special" teachers, in the common acceptance of that term, you may be appalled at the suggestion that you must take onto yourself additional responsibilities with your already crowded curriculum, but in reality Mrs. Richards is not giving you more work, she is making the way clear for better work.

Accepting Mrs. Richard's statement that "unquestionably the school has drawn the interest of the child from the home, with the consequent loss of his sense of the responsibility and relationship developed through the daily co-operation in the family life," can we not, as teachers, try to shift some of the blame for the present conditions to other causes? In cities, the modern apartment, the convenient cottage, with their labor-saving appliances, the crowded tenement with its small rooms, have been planned with no thought of children's activities. In towns, where there are few class distinctions, life is normal and the home and the school are one; in rural districts, where the possibilities are greater, life often goes on in a routine, with standards based on traditions, not growth.

Bakeries, markets with fresh products from every section of the country, the increased production of prepared foods—biscuits, cereals, soups, meats and fruits— all tend to eliminate housework. Ready-made clothing and every "notion" one desires for the house are displayed in the department store to tempt the housewife. Laundries take away another so-called burden, and again the child's development is left out of the home plan. Yet the home must continue to be the greatest factor in the community.

Parents almost without exception have a conviction that children should have an education. They sometimes have

no clear idea of the plan, but Mrs. Richards is right when she says that the result must be "efficiency," and to that quality I would add "service."

Admitting that the school has the power to revive the interest, I am not quite willing to admit that the interest of parents and children in the importance of home duties is really lost. Mrs. Richards has given you a key.

Children care very little for the finished product, it is the process that interests them—the construction. Their reading, geography, mathematics, drawing, manual training, sewing, cooking, can all be so thoroughly a part of the plan that the school and home are one. Neighborhood houses, playgrounds, visiting nurses, various associations for the uplift of the unfortunate, take from you the burden of obligation to any but normal children, and surely you can do your part even though you have not had the special training which tends to broaden your sympathies.

The upper grammar grades and secondary schools are provided for, but it is your privilege to deal with children at the formative period, and here the play sense is your guide and aid. Bringing children into contact with the real things in life must not dull the edge of the play spirit, because drudgery is the result, and that factor must be eliminated if we would have true happiness.

Take the story of the house—consider grades below the sixth. Suppose you have no manual training in your schools in those grades. Find an unused corner in your schoolroom, hall or recitation room. You will need the janitor's saw, square and hammer, and maybe his co-operation. With boxes from the grocery or dry goods store, the remnant counter for inexpensive materials, quiet in tone, you have your furniture. Burlap screens are as good as walls and may be adapted to many uses. The house may be used by several classes if the teachers will work out their plans together.

Mrs. Richards has told you what to do and how to do it, and it is for you to adapt your plan to the ideal she has presented to you. If you are in earnest you will find help on every side, school gardens will contribute and mothers' clubs will give you the wherewithal to purchase necessities. Shall all the children be given this work? Yes, but in varying degree. The child from the good home, through his willingness and ability as an

example to others, is helped by the school which serves to strengthen the home lessons, while the result of the help for the untrained child is obvious.

It is work for a purpose, and self-activity counts for the best development of the child.

You may not be able to carry out any of these suggestions immediately, but the thought that you are in a sense, from the very nature of your calling, responsible for the child's growth along right lines, will help strengthen your own understanding of the whole value of right living.

BUSINESS EDUCATION FOR GIRLS.[a]

The business education a girl needs depends upon the business and the girl. We will not enter any controversy as to comparison of ability. When the girl enters the field we mere males will climb the fence and give her the whole pasture. Many of the girls are so much brighter than their brothers that the latter get lost in the woods. We are ready to concede all this and anything else the girls demand, for some of us have learned by experience the futility of argument with those to whom the rules of logic are of infinitely less importance than those of Butterick or May Manton.

Having cleared the decks let us see whether we can get back to first principles. The state and the nation are built on the home, and can be no better than the materials which that furnishes. Good homes make good citizens. Deterioration and ultimate disintegration must result from the inferior citizenship produced in bad homes.

There is only one person in the world who can make a good home. That is a good woman who becomes the wife and mother. She may be capable of becoming a good lawyer, physician, minister, stenographer, bookkeeper, teacher, or business manager, but men can do all these things very satisfactorily and successfully. This one thing she alone can do, and to this one thing all her instincts tend. If, then, we are to have good citizens, good laws, good government and a future worthy of our past, our girls must have the kind of education, first of all, which will prepare them to be good wives and mothers.

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[a] An address by S. R. Hoover, Vice-principal of the High School of Commerce, Cleveland, O., before the American Home Economics Association, Denver, Col., July 7, 1909.

The great probability being that the girl's business will be attempting to make a home, let us place first on the list of her studies Domestic Science. Teach her how to cook—not blanc mange and fruit cake—but the essential foods. Since she must "feed the brute" to retain his affection, she will find it much more permanently bound by good bread and well roasted beef than by angel food and floating islands.

Teach her to make, not point lace and embroidered pillows, but aprons, dresses, and children's garments. Add the fundamentals of health and hygiene, especially for young children. The great mortality of the human race is in the slaughter of the innocents, a large part of which is due directly to the ignorance of mothers. A sufficient knowledge of accounts to make her accurate and to develop system and economy will add in large measure to her office of helpmate—perhaps enough to insure the ownership bye and bye of a patch of ground and a cottage. These things may be much more attractive and the home may become the most pleasant place in the world, as it should be, by the addition of Domestic Art to Domestic Science. These things the girl should know, whatever course of study she takes, and whatever school she enters.

If there remain more time, literature and other humanities will add to her efficiency in her circle and to her pleasure in her associations. To the dyspeptic croaker, whether in trousers or petticoats, who will shake in malarial impotence of rage over this picture of slavery to the kitchen a sentence is due. It may be that some unusual exigency in domestic affairs or some abnormal weakness toward the fascination of commercial activity will drive the girl to the office, the shop, or the factory. But he who fosters the inclination of the girls toward these pursuits to the disfavor of home making and home keeping is stifling the call of nature to her dearest children, in robbing them of the crowns which would make them queens and giving in return only cheap tinsel, for when they marry, as the great majority will, the whole bottom of health, happiness, and morals will fall out of the home if they have not been prepared for their responsibilities as wives and mothers.

INFLUENCE OF INDUSTRIAL ARTS AND SCIENCE UPON RURAL AND CITY HOME LIFE.[a]

The new order of things has come, but women, so far, have not been given the means with which to utilize it.

To whom shall we turn for experience and knowledge? To the men in the Industrial world.

The management of American industries, the methods of the American business world stand at the very front, brought there by using the lessons of experience to form a definite science of business methods.

The home cannot be maintained without labor—how much labor depends upon the perfection of the machinery. Given this machinery, woman's greater flexibility of thought and adaptability of manipulation will be utilized. She must feel the sense of power over things.

The girl needs as much manual training as the boy; the means may be different, but the goal is the same, "to train workmen to do better work." For the well-being of her family, she should be taught to know the machinery of the home and how to care for it, as well as the boy who is to be trained as an engineer or for some industrial enterprise is taught to know his plant.

There must be another workshop added to your group. What shall it be—a station for the application of the industrial arts and sciences to the home? In the study of electricity, I wish we had a room in one of our educational institutions as well equipped with household appliances as is the salesroom of a modern electric light company.

Again, we are turning to the outside industries for the development of manual training and we must utilize this same tendency if we mean to cultivate woman's efficiency in her traditional department that she may continue to control it.

The time is ripe for the movement.

The family, the house, its furnishings, its management, its daily care, its needs in mechanical appliances, its ethical standards, and the share of the income it needs to carry it on successfully under *twentieth century conditions*, must be determined and we must fully realize the bearing of mechanical and economic changes upon the material surroundings of the home life. This preparation cannot be too closely interwoven with all school work.

[a] A synopsis of an address by Mrs. Ellen H. Richards, before the Department of Manual Training, National Education Association, Denver, Colo., 1909.

COST OF LIVING OF THE WORKING CLASSES IN EUROPE.[a]

There are reported in the publication under consideration the results of an extended study undertaken by the Board of Trade of Great Britain of the working class rents, housing, retail prices and standard rates of wages prevailing in a number of occupations in the principal industrial towns the monographs dealing respectively with conditions in the United Kingdom, Germany and France.

In the report dealing with the United Kingdom, detailed reports from 94 towns and summaries of the data are given, together with information in appendixes regarding the percentage of the population in each town living in different kinds of tenements and in overcrowded tenements, the weekly time rates and wages of skilled men in different trades, and similar topics.

Out of a total of 1,944 families, 261 reported a weekly income under $6.25; 596 of over $10; and 416 of $7.50 to $8.75. The proportion of income spent on food diminished as the income increased, two-thirds of the total expenditure being for food where the incomes were less than $7.50, and about 75 per cent in the case of incomes of $10 and over a week.

"The amount spent on bread and flour together does not show much variation in the different ranges of income, except in the cases of incomes above $10 where the family income is augmented to a greater extent than in the other groups by the earnings of children and in which the children included are older.

"In the case of incomes below $6.25 the expenditure on bread and flour forms about 21 per cent of the total spent on food; for incomes between $8.75 and $10 the proportion is 15 per cent. The quantity of bread and flour purchased varies from 28½ to 37¾ lbs. per week, the average being 32 lbs.

"The average expenditure on meat and fish of all kinds is seen from the table to be $1.59½ per week. . .

"If we turn to other articles of consumption we find that fresh milk accounts for 16 cts. a week in the families with incomes below $6.25, but the expenditure on fresh milk rises rapidly with the income. The average expenditure for all families is 31½ cents. . .

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[a] A. W. Fox, London: Govt. Cost of Living of the Working Classes [in the United Kingdom,] 1908, pp. LIII+616, maps 2; Cost of Living in German Towns, 1908, pp. LXI+558, map 1; Cost of Living in French Towns, 1909, pp. LIV+430.

"Oatmeal is consumed largely by the Scotch working classes, but hardly at all in England, whilst on the other hand foreign and colonial meat, a common article of food in England, is much less used in most parts of Scotland. . .

"Rice, tapioca, and oatmeal account for an expenditure of from 9 cts. to 14 cts. a week, a considerable portion of this amount being accounted for by the expenditure on oatmeal in Scotland, which amounts on an average to 16½ cts. per week."

Some statistics are also given for other food groups.

Housing conditions and other similar topics are discussed at length.

"As a basis of comparison the levels of rent, prices, and rates of wages in the Middle Zone of London were taken as standards, and index numbers have been calculated for each of these items in every town, so as to afford an indication of the relative levels of the towns, in relation both to London and to each other. For Scotland and Ireland supplementary standards were obtained by the adoption of Edinburgh and Dublin respectively as bases, so that for the towns of each of those two countries a two-fold comparison has been made—one with Edinburgh or Dublin, and one with London."

Attention is especially directed to the "remarkably high level of rents which prevails in London as compared with the rest of the country. In Scotland the rents in the capital are only slightly higher than those in the other towns; but in Ireland, Dublin shows a markedly higher level than the rest of the country. If we exclude London, the variation of rents in England and Wales is not very great, and prices are on the whole singularly uniform, with the result that for equal accommodation and equal provision of food and fuel the necessary expenditure would not differ very much from one town to another.

"Another fact is that the tenements of 4 or 5 rooms (i. e., self-contained two-storied dwellings, possessing 4 or 5 rooms and a separate scullery) are by far the most predominant types of housing accommodation in England and Wales, and may be taken as the typical dwellings of the English working class. Finally, it may be noted that the comparison made in the present investigations between the relative levels of wages, rents and the retail prices of commodities in different industrial centers does not disclose a sufficiently close connection between the local varia-

tions of wages and cost of living to justify any general conclusion beyond the well-established fact that both factors are higher in London than in other parts of the United Kingdom. Further light, however, may be thrown on this question when the inquiry now in progress as to the earnings of the working classes is completed."

The report dealing with German conditions includes investigations made in 33 of the industrial towns of the German Empire. It contains an introduction by H. L. Smith, a summary by the author, detailed reports and appendixes with data regarding wages and hours of labor, weekly rents, housing and lodging house regulations, regulations regarding the inspection and sale of food, and similar topics.

As regards the total expenditures for foods of different kinds, the budgets show that the total weekly expenditure on meats of all kinds, including bacon, fish, etc., was from 97 cts. in the lowest income class, to $2.24 in the case of family incomes above $10 per week. The average weekly income was from under $5 to over $10, ranging in the greatest number of families from $6.25 to $8.75.

"Between the United Kingdom and Germany the differences in some respects are very marked. The prevalent type of working-class housing in England and Wales, and to a lesser degree in Ireland, is a self-contained two-storied dwelling, possessing generally 4 or 5 rooms and a separate scullery; in Germany the predominant type is a flat of 2 or 3 rooms with appurtenances, in a large tenement house. The German housing system thus approximates more closely to the Scottish type—blocks of flats of 2, 3, or 4 stories—than to the English. English, but not Scotch, rents of working-class dwellings usually include local taxation, which is based on the rentable value of the dwelling; in Germany local taxation is levied on an entirely different basis, and is not included in rent. In regard to food the British workman's meat consists mainly of beef and mutton, whilst pork (even including bacon) is relatively small in amount; the German workman on the other hand, eats chiefly pork (including sausage) and beef, and only a very little mutton. The pure wheat bread eaten by the working-classes of the United Kingdom is replaced in Germany either by pure rye bread, or more commonly by some mixture of rye and wheat. . .

"It may be pointed out that there is little if any difference between the general levels of rent in Germany and England, though rents in England include a considerable element of local taxation, whilst rents in Germany do not; and that rents in Berlin exceed those of all the other German towns investigated (except Stuttgart) to practically the same extent as rents in London exceed those which prevail in other towns of the United Kingdom.

"Further the range of town prices levels in Germany, as in the United Kingdom, is not very great, though somewhat wider in the case of the German towns, with the result that the difference, between the cost of living (so far as it relates to expenditure on rent, food, and fuel) in one or another of the German towns investigated are not very much larger than those which exist between the towns of the United Kingdom. The general level of prices is, however, distinctly higher in Germany than in the United Kingdom, and in this connection an important instance of the effects of differences in national habits may be noticed. The English workman going to Germany and maintaining his accustomed standard of living would find his expenditure on food and fuel substantially increased; but in spite of the generally higher level of prices in Germany the German workman coming to England, and maintaining his own standard, would not find his expenditure reduced in a corresponding proportion. This is due mainly to the fact that the German workman takes much more than the English workman of certain food commodities, chiefly potatoes and milk, which are cheaper in German than in English towns.

"Finally, whilst nominal rents are as high in Germany as in England—and in fact higher, since they do not include local taxation, which the German workman must pay separately—and whilst the general level of food prices in the German towns is also higher than in England, wages in those trades for which a comparison has been made are substantially lower, even when longer hours are worked."

Similar data are reported for the principal industrial towns of France in the third volume. Here also there are detailed reports for the different towns, and summaries of data on municipal regulations and legal enactments regarding food and lodging, specimen factory rules, and similar subjects.

"The main subjects of investigation were the principal types of housing for the industrial population, the customary standards of accommodation and the rents commonly paid by working-class tenants; the kinds of food usually consumed by working-class families and the prices most generally paid; and wages and hours of labor in the principal occupations in each town. In order to arrive at some estimate of the standard of living prevalent among the French industrial classes, over 5,600 budgets showing the expenditure on food by working-class families in a normal week, and representative of numerous occupations and of all grades of working-class incomes, were obtained from the various towns and are analyzed in the present volume. . .

"In regard to food, the meat dietary of the French working-class family shows a much greater variety than that of either the English or German family of the same class; horseflesh appears to be more largely consumed (chiefly for reasons of taste) in France than in Germany, whilst poultry is much more conspicuous in the food bill of the French than of the English family. The French workman like the English, eats pure wheaten bread; the bread made of rye, or of rye mixed in various proportions with wheat, so popular in Germany, are little known in France. Vegetables play a much more important part in the dietary of the French than of the English working-classes; when allowance is made for the smaller size of families, the consumption of milk is only slightly higher, whilst that of sugar is on the other hand, decidedly less."

The Care of Food in the Home.

"We are paying higher prices for the staples of life nowadays—milk, butter, meats, due in part to the extra cost of producing the same in a sanitary manner. The rise of the standard of producing food has forced the producer to increase the price of food; and is it not the part of the consumer to make this extra cost worth while? Should not the consumer as well as the producer take pains to keep milk, cream, meats and other foods clean, pure, free from bacteria, and fit for eating? Instead of the common practice of leaving milk on the kitchen table some time after delivery exposed to heat and dust, it should be promptly and carefully put away under cover and in a cool place." F. W. SHUMWAY, Hygiene and the Housewife, *Dietet. and Hyg. Gaz.*, 25 (1909), No. 4, p. 241.

A NEW METHOD OF HOUSEKEEPING: THE FICK APARTMENT HOUSE OF COPENHAGEN.[a]

An attempt to reform the state of affairs whereby the mother is expected to be, as Charlotte Perkins Gilman says, an embryo combination of cook, nurse, laundress, chambermaid, waitress, governess, and housekeeper—Jack of all trades and master of none—has been made by Otto Fick,who established an apartment house of a novel type in Copenhagen in 1904. The apartments —twenty-five in number and containing from three to five rooms each—are rented unfurnished, so that each family can furnish its home in accordance with its own tastes and requirements. Each apartment has a kitchenette with a gas stove and a bathroom, supplied with hot water day and night. Electric light and central steam heating are included in the equipment, and each apartment is connected by telephone with the general kitchen, and also with the public telephone system. Meals are prepared in the general kitchen and sent up to each apartment by means of an electric dumb-waiter.

Privacy is as complete as in an apartment house of the usual type. The only commercial feature is the centralization and specialization of every task of housekeeping—cleaning, ventilation, lighting, heating and, preparation of food—so that the tenants are entirely relieved of the burdens of marketing, making fires, cooking, serving, dishwashing, etc.

Luncheon is served in the apartments from ten to twelve, and neatly packed luncheons are provided for school children and others who desire them. Dinner is served in the afternoon, according to Copenhagen custom, and tea until ten in the evening.

The menu is so extensive and varied that monotony can be easily avoided,and the general kitchen has a list of the preferences, and particularly of the aversions, of every family, in which it is gravely set down that one family is never to be served with mushrooms, a second with cabbage, a third with rice pudding, etc. Individual, as well as family preferences are respected.

Dishes, plates, cups, etc., of the so-called "unbreakable" ware are furnished by the management, but each family may provide its own tableware and have it washed in the general kitchen,

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[a] A portion of a translation from *Umschau* by Scientific American Sup., 67 (1909), No. 1745, p. 375.

without, however, any guarantee against breakage. Laundry work, extra service and meals for occasional guests are furnished at low rates.

Cheapness, indeed, is the guiding principle, and cheapness combined with excellence is attainable only with the aid of centralized housekeeping. The kitchens and other service rooms in the basement are equipped with the most approved apparatus, and the food and other supplies are abundant and of the best quality.

The annual charges for rent, heat, light, baths, food, and service, including pneumatic "sweeping," window cleaning, and even shoe polishing, range from $420 for two adults occupying a three-room apartment, to $930 for four adults occupying a five-room apartment.

Small additional charges are made for children and servants.

This first centralized apartment house has proved so successful that others are projected. Fick also purposes to erect a house with large general playrooms for school children and for small children. Nurses will also be provided so that mothers who have occupations away from home will be able to leave their little ones in safe keeping.

Among the advantages claimed for the Fick system is that it settles the servant question to the advantage of both employer and employed. Much of the work of the centralized household is performed by machines and the rest is skilled labor with definite hours of work. When housekeeping is thus raised to the rank of a specialized industry it will attract workers of a more intelligent class who now very justifiably refuse to work sixteen or eighteen hours a day.

Again under the present system a house is attainable by an unmarried man or woman, yet the cost and burden of housekeeping act as preventives of marriage. The system is very elastic and allows of apartments of two rooms, or even one room, and of general dining rooms, reading rooms, etc.

Finally, the lifting of the burden of housework makes possible a reform in child culture.

EXHIBIT AT THE ALASKA-YUKON-PACIFIC EXPOSITION OF THE NUTRITION INVESTIGATIONS OF THE OFFICE OF EXPERIMENT STATIONS, U. S. DEPARTMENT OF AGRICULTURE. (See p. 449).

HOME ECONOMICS AT THE ALASKA-YUKON PACIFIC EXPOSITION.

Although there was no central exhibit of Home Economics work at the Alaska-Yukon Pacific Exposition, various phases received considerable attention. The following article presents a brief description of the illustrative material shown by the Office of Experiment Stations of the United States Department of Agriculture in connection with its Nutrition Investigations, and comments by Mrs. E. H. Richards on the work shown by educational institutions in Domestic Science and Domestic Art.

Nutrition Exhibit of the Office of Experiment Stations.—The work of the Office of Experiment Stations and other Bureaus of the Department of Agriculture was represented by exhibits in the Government Building. The accompanying illustration shows the exhibit illustrating the investigations in human nutrition which was installed in one of the large pavilion cases. A prominent feature of this exhibit was a model of the respiration calorimeter as it was installed at Middletown, Conn., built to a scale one-fourth the actual size of the apparatus. The model was so arranged as to show the construction and operation of the calorimeter, while the numerous labels explained the purpose of the different parts and the way in which the apparatus is employed for studying the use which the body makes of food by determining the balance of income and outgo of matter and energy.

The composition of the human body was illustrated by a series of jars containing the quantities of water, protein, fat, and carbohydrates in the body of a man weighing 154 pounds. The same method was used for showing concretely the comparative composition of bread, meat, milk, eggs, potatoes, and apples. In addition, the fuel value of these foods was shown by means of bottles containing definite quantities of coal.

Studies of the relative losses sustained when meat of different sorts is cooked in a variety of ways have been an important feature of the Nutrition Investigations of the Office of Experiment Stations. This work was illustrated by wax models of raw beef and the same cut when boiled, broiled, and roasted. The relative amount of material removed by each method of cookery was

shown by a series of bottles containing the proper proportions of water, protein, and fat.

A portrait of Professor Atwater, who instituted the Nutrition Investigations, was also shown in this case, together with thirteen framed charts which depicted by means of colored diagrams the composition of the more important food materials. These charts were drawn and colored particularly for this exhibit and have not been published for distribution.

The exhibit also directed attention to the bulletins and other publications which have been issued in connection with the Nutrition Investigations.

Work in Domestic Science and Domestic Art.—The progress in territory covered and number of schools giving work under this head could be well studied in the exhibits.

Although it was not practicable to send the Mary Lowell Stone Home Economics exhibit, the ideas for which it stood were to a degree carried out in the exhibits of the work of the Oregon Agricultural College, where house plans and schemes for house decoration were shown. The exhibit of Domestic Art in the way of clothing showed restraint in design and good quality in material. The secondary courses in this school take girls from the eighth grade. They include plain cooking, simple dietetics, laundry methods, observational work on the home and its surroundings, plain sewing, dresses and millinery.

The degree courses take girls of sixteen years old who have had two years of high school work, and embrace advanced and special cookery, marketing, etc., bacteriology and normal methods, basketry and weaving, advanced sewing and millinery.

The institution is thus doing about what the technical high schools of the large centers are now aiming to accomplish and what more and more of the most up-to-date high schools are going to do in the near future.

The State College of Washington, located at Pullman, had a full exhibit. The object of the Department of Domestic Economy, of which Miss Lucy Gertrude MacKay is acting head, with Miss Frances McKay, instructor in Domestic Art, and Miss Leila Wall Hunt, instructor in Domestic Economy, is two-fold: To train young women in what pertains to the management and care of the home and to prepare teachers in these subjects. Instruction is given in the fundamental principles and the

practice of Domestic Economy, including the study of foods and cookery, the study of textile fabrics and the making of clothing, and of the arts and sciences that have a direct bearing upon these matters. An illustration of the new Domestic Economy Building of this college constitutes the frontispiece of this number of the JOURNAL.

All through the buildings exhibits of sewing, embroidery, basketry, etc., were to be found and some of the public schools showed good hand work, but there was little evidence of a sound science basis back of it all, and almost no example of good selection as to material and form of making up in the sewing. It was mostly after the prevailing "style."

There was one ingenious illustration of how limited space and resources can be economically used rather than to omit the instruction altogether. This Mr. Johnson showed in the King County Building, the room of the Denny School used in common by the boys for manual training and the girls for cooking. The same bench serves for both classes at different hours. The benches are varnished and smooth. The girls have the top drawer opening on the back of the desk, the boys the bottom drawer for tools. The vise holder comes up on the right side, the gas pipe and stop cock to which a rubber hose may be attached, on the left. The girls have a cooking board which they place on the top and when they are through it is cleaned and set away as are drawing boards.

There are some twenty cooking centers in Seattle and three or more high schools which give work alternating with sewing and designing. All material is furnished by the city. Sewing in the seventh grade consists in making caps and aprons for later use.

EDITORIALS.

The December Meeting.

We wish to call to the special attention of our readers the full program on another page of the Second Annual Meeting of the American Home Economics Association to be held in Boston on December 31 and January 1, next, in connection with the meeting of the American Association for the Advancement of Science. The opportunity to hear the speakers mentioned will not form the only inducement for attendance; perhaps of still greater value will be the informal meetings between those having mutual interests. The sessions will be especially valuable to teachers.

Address List of Members

In the February number of this JOURNAL will be printed a revised list of the names and addresses of the members of the Association. Any changes of address must be sent to the secretary, Mr. Benjamin R. Andrews, 525 W. 120th St., New York City, before December 20th.

The Housewife and this Journal.

A member of the school board in a country town was wont to say to all proposals for a trial of new methods, "It's against my experience, you can't beat a man out of his experience." Delivered impressively by a man of portly habit that was a "poser," but the nimbler wits of youth prompted the reflection that although his experience might have touched the educational systems of the five continents yet its whole value lay in the conclusions he was able to draw from it. Now this interpretation of our experience depends on two things: First, on our innate ability, whether it is poor, average or first class; and second on whether our observations in any given field have been haphazard or have been directed along the lines of what is called by the scientist "the expeiment." That is, a problem is clearly recognized and stated, facts bearing upon it are gathered, tested for their truth and recorded in order; conclusions are then carefully drawn and used as a basis for further enquiry. Exactly these processes, used perhaps unconsciously, are applied by an acute and orderly mind to the conduct of life and the result is what we call a person of sound

judgment. But in a definite occupation or business the mental process must be aided by the written record, the well-thought out plan, the ordered arrangement of materials. The country tanner of two generations ago put his full trust in his inherited methods of managing his one vat and he chalked his accounts on the door; his son opened a set of books and began to look into the methods of rival tanners. His successor of today has at his command experts at the head of every department and a well appointed laboratory where the results of modern science are applied to the improvement and cheapening of his products.

Now the experience of the middle-aged housekeeper has seldom been governed by the limitations of "the experiment." Such knowledge as she has is in reality a by-product of a vast number of unrecorded and half observed events. For the more exact and vastly more economical gathering of knowledge, by methods known to the laboratory, the housewife lacks the training, and the outfit, especially the instruments of precision. Above all, she presides not over a laboratory, products of which are considered of no value except for teaching purposes, but over a factory the output of which—good food, clean and attractive rooms, suitable clothing and all the rest,—must not fail. By any methods known to her, usually those she has inherited, she must bring some semblance of these results to pass, and that daily.

"Can you partially cook your jelly one day and finish it the next"? asked a young housekeeper of an older one, "it would sometimes be so convenient."

"I did not dare try it" was the reply, "I never had time to use any but the way I knew."

"Does it pay to sift your ashes?" was the next question. "Well, I've thought I'd weigh the cinders and compare with the coal. But I've no large scales and then there's the time. I hardly think it would pay to hire it done, and yet I'm not sure."

These and a hundred other practical questions that arise daily in any household are not to be answered by the editor of the "Woman's Page." Any one of them may be enough to engage the attention of a laboratory worker for months before the authorative answer can be given. No doubt there were people fifty years ago to say, "Why an agricultural experiment station? Every farm should be one." But it was found that the farmer with his planting, his mowing, and his reaping, his

stock feeding and his fence mending, had little time to experiment on silos and cross fertilization, even had he possessed the necessary training and facilities.

In the same way all that relates to home hygiene and household methods affords a wealth of material that needs careful study by trained people having proper equipment in order that existing knowledge in the fields of chemical, physical, and biological science may be applied to these special problems. Much work is available to those who know the results of studies in the technical institutes of Europe. The like is being done to some extent in our 40 agricultural colleges, the U. S. Department of Agriculture and in such special institutions as the Lewis and Armour Institutes, Teachers College and the Pratt and Drexel Institutes. Original work, even, is being done by the graduating classes in Home Economics, in state and other institutions, and it is the aim of this JOURNAL to publish these theses so far as may be. It has already furnished articles of this kind and in our present number we publish three important studies of practical subjects.

We have also in hand studies, similar to those mentioned, on a comparison of various cooking utensils and another on the adulteration of silk fiber.

Every intelligent housekeeper should recognize that work of this order, although accumulated but slowly, rests on firm foundations, and that the results help to provide definite answers to the questions which interest her.

Incidentally it may be mentioned that the need of scientific studies made under known conditions is well illustrated by two of these very studies. Both represent serious and painstaking effort to obtain information on the same general problems; yet at first glance the results obtained differ in some respects. More careful examination of the data, however, reveals as the cause of the apparent differences local variations, such as the price of fuel. Since in each case these have been recorded, their influence may be judged, and erroneous conclusions thereby be avoided.

AMERICAN HOME ECONOMICS ASSOCIATION.

Provisional Program of Second Annual Meeting, Boston.

Thursday, December 30, 1909.

Meeting of Executive Committee, 9:30 a. m., Hotel Westminster.

Meeting of Council, 2:30 p. m., Mass. Inst. Tech.

Informal dinner of Council, Thursday evening.

Friday, December 31, 1909.

General meeting of Association, 9:30 a. m., Simmons College.

Topic: The Sciences in Relation to Home Economics Courses.

Among these are: Architecture, Biology, Chemistry, Economics, Physics (Heat, Light), Physiology and Psychology.

Subscription luncheon, 1:00 p. m., Hotel Westminster.

Roll call. Reports from the field.

Section meetings: 3:00 p. m., Simmons College. Adjourned meetings in the evening.

Hospital dietetics, High School Courses, Grade work (methods of teaching), Settlement work (methods of teaching), Open-air schools, Utilization of Cooked Foods in Lunches, Trade and Vocational Teaching, are among the topics to be discussed.

Saturday January 1, 1910.

General Session, 10:00 a. m., Simmons College.

Topics: (1) The Outlook: President's Address; (2) Plans of the Executive Committee, by the Secretary; (3) Plans for the *Journal*, by the new editors.

Election of Officers and Reports of Committees.

Meeting of the New Council, 2:30 p. m.

Excursions to places of interest.

Note—This program may be modified to permit of attendance on meetings of interest at the American Association for the Advancement of Science and its affiliated societies.

Hotel headquarters: The Westminster, Trinity Place, Boston. Other hotels near are the Copley Square, the Lenox, and the Nottingham. The Local Committee will have a register of other boarding places. No special railroad rates will be provided, but reduced rates may be secured by membership in the American Association for the Advancement of Science. Association membership fee $3.00.

Members desiring further information, final program, etc., should apply to its Secretary Miss Isabel F. Hyams, 26 Wales Street, Dorchester, Mass., or to Mrs. E. H. Richards.

NEWS FROM INSTITUTIONS.

Colorado State Agricultural College. Miss Mary F. Rausch, head of the Department of Domestic Science, writes that a school of agriculture was opened on October 5. "This includes both agriculture and Domestic Science courses and fits the students for home and farm life. There is an enrollment of 155 students, of whom 52 are young women. In order to enter this course, students must have passed the 8th grade work, and we have many students this year who have had one, two or three years of high school work. The work is given for three years, from October to April of each year.

"In our regular college work we have 24 girls. The majority of the girls are preparing for teachers, and are taking the four year course which leads to a degree of Bachelor of Science.

"With the assistance of Miss Allison, instructor in Home Economics in this department, I am now working on a bulletin on high altitude cookery.

"The college is in co-operation with other colleges in working with the Beef Producers' Association of the United States. We are trying to educate the women in the use of the cheaper cuts of meat, their selection, cooking and serving.

"There are 86 young women enrolled in the college, and 76 are taking Home Economics work. The Home Economic Club was organized last week with an enrollment of 24. The School of Agriculture Domestic Science Club was also organized with an enrollment of 52.

"The college is working in co-operation with the women's clubs of the state, and we are trying to introduce Domestic Science into the public schools. This year several of the public schools have started the work.

"The annual meeting of the Colorado State Federation of Women's Clubs was held in Leadville, Colorado in September. We have asked each club in the State to devote at least one afternoon during the year to some phase of Home Economics work.

"We have one woman 40 years of age and one over 50, who are taking the work in our department."

University of Illinois. The Household Science Department announces that through the co-operation of Professor Kinley of the Department of Economics and Dean of the Graduate School, and Dean Greene, of the College of Literature and Arts, a course in household administration will be offered during the coming year. The aim of the course is to provide an opportunity for a serious study of the problems of home and family life with the emphasis on economics.

University of Vermont. A Department of Home Economics has been established under very auspicious conditions. The alumnae of the university are raising $1,000 for equipment, $700 of which has been applied to furnishing laboratory and lecture rooms in Morrill Hall.

Miss Bertha M. Tirrell, formerly of the Hartford School of Religious Pedagogy has been chosen to carry on the work. Courses were given during the Summer Session, July 12–August 7, and four elective courses are offered for seniors the present year, which have been generously elected. Courses for juniors and seniors and a special course of 2 years have been planned with chemistry, bacteriology and advanced physiology as prerequisites which a large number of undergraduate students are preparing to take. An extensive course of lectures has been offered in response to a request of the teachers of the city and thirty-five have responded.

The work has been introduced into the university with the enthusiastic support of faculty and alumnae and there is promise of a large department in the near future. Miss Tirrell's influence is also to be felt outside the university walls. She has a class of 24 high school seniors twice a week studying shelter, to be followed by courses on clothing and food, and she is to speak before the State Horticultural Society and the State Dairyman's Association.

University of Wisconsin.

Over 100 have enrolled in the department of Home Economics of the College of Agriculture, of whom 54 are in the long, or four-year course, and about 45 in the general survey and art and design courses which are open to election by students in the College of Letters and Science, and designed for those who desire a general knowledge of the subject of Home Economics.

The general survey course is given by Prof. Abby L. Marlatt, in charge of the department, assisted by Miss Alice Loomis. The course in art and design, given by Miss Leona Hope, takes up the study of the fundamental principles of design as applied to problems in household decoration. Many of the students enrolled in this course have had previous training in Home Economics.

To quote from a letter from Miss Marlatt: "While there are thirty-two electives to be chosen from any of the courses offered by the colleges in the University and the intention is to give each student an opportunity to choose that which may best develop her peculiar talents yet the choice of elections which are advised are chemistry, biology, economics, sociology, psychology, and education. The special and graduate students are doing this, as they all desire to enter the teaching profession.

"We have one fellowship worker, whose thesis work is to be done in bacteriology and home economics.

"We are in the Agricultural College building now, but hope to be located in a few months in our new laboratories in Lathrop Hall."

University of Wyoming.

A special train, "The Ranchman's Special," was sent out by the university, October 17 over the State, on which the Home Economics work was represented by Professor Minna N. Stoner, of the Department of Domestic Science.

The train contained a full exhibit of illustrative material pertaining to Domestic Science work, and this attracted a great deal of attention, much of it from ranchmen, business and professional men. The economic

value of the fireless cooker and the advantage of ventilation in cooking in certain utensils were points especially emphasized. Over 1,500 copies of State and U. S. Department of Agriculture bulletins on foods and related topics were distributed on the trip.

Yale University. The laboratory of Dr. Lafayette B. Mendel of the Sheffield Scientific School is very popular with teachers of Home Economics. There are with him at present: Miss Isabel Bevier of the University of Illinois; Miss Louise Stanley, of the University of Missouri; Miss Amy L. Daniels, of the Springfield (Mass.) Technical High School; Miss Alice F. Blood, of Simmons College and Miss Jessamine Chapman of Sweet Briar College, Va.

Chicago Public Schools. The Domestic Science and Household Arts work in the public schools of this city has been reorganized as a special department under the direction of a supervisor. It is expected that this will necessitate no radical changes but will tend to greater unification of the work. Miss Mary E. Snow, formerly of Pratt Institute, has been appointed supervisor and has entered upon her duties.

School Lunch Rooms in Philadelphia. The Principal of the William Penn High School, Dr. Herrick, has obtained the consent of the Board of Education to establish a well-equipped lunch room. The William Penn High School was opened this fall in a beautiful new building which accommodates 1,700 pupils. The lunch room is situated on the ground floor, on the south side of the building and will seat 400 persons. There is also a dining room for the faculty. Miss Emma Smedley has been selected to superintend these luncheons and expects to begin work at once.

Hope Farm School for Children. The Episcopal Church has established a protectory home for children at Verbank, Dutchess Co., N. Y., where in addition to the usual studies, agriculture and Home Economics are taught. The children assist in the laundry work and the baking for the farm under the direction of Miss Elene E. Geer who has charge of instruction of this character. The Right Reverend David H. Greer is the president of Hope Farm.

NEWS FROM THE FIELD.

Formation of a New England Home Economics Association.

The formation of a New England Section of the American Home Economics Association was first formally considered at a meeting in Boston, May 25. This was called by Mrs. Ellen H. Richards, president of the American Home Economics Association, who with Miss Sarah Louise Arnold and Miss Abby L. Marlatt of the council, and about 15 other members of that association, formed the nucleus of the gathering. Over 70 persons were in attendance, and remarks were made by a large number in favor of an organization. A resolution was adopted under which Mrs. Richards became the chairman of a committee to consider the details of organization, and report at a meeting in October.

This adjourned meeting was called to order October 9, by Mrs. Richards at Simmons College, Boston, with about 125 in attendance. Greetings from President Lefavour of Simmons College were read in his absence, and Miss Arnold extended a welcome on his behalf to Simmons College with its 700 students of whom more than 300 are directly interested in household economics. In her remarks Miss Arnold also expressed the deep appreciation and gratitude of all to Mrs. Richards for her faithful and unfailing attention to the cause of Home Economics and for the work which she has accomplished.

A discussion followed in which Dr. Bracket of the School for Social Workers, gave as the reasons for his deep interest in Home Economics its relation to practical eugenics, and to the higher side of human progress.

Professor W. D. Hurd, formerly of the University of Maine and recently appointed director of short courses at the Massachusetts Agricultural College, spoke with special reference to farm conditions. He attributed the decaying condition of the average New England farm to the attitude of the father and mother against farm life. He felt that the safety of the nation lay in educating the people on the farms to a real understanding and interest in their work.

Mr. Hollis Godfrey explained in some detail the way in which the sciences had been introduced into the Boston Girls' High School of Practical Arts. Miss Helen Thompson spoke of what was being done at the Rhode Island State College for young women, describing the work as "a strong course in the physical sciences with the major line of Home Economics in foods, that is, the study of the question of foods as to the constituents, chemical composition, cooking processes, etc., in this way more closely relating the work to the manual training schools, and carrying it into dietetics, normal nutrition, and sociological problems that affect the home."

Miss Bertha M. Terrill, from the University of Vermont, said that though the work was only just started there, the enrollment was over 70 students and that a large increase was expected. At the opening of the college year additional courses in chemistry, biology and physiology, a course for high school seniors, and a lecture course for teachers had been offered to which a great many had responded.

Mr. Weaver of the Boston Trade School for Girls, and Master of the Girls' High School of Practical Arts, then spoke, saying that from his point of view, too many of the shortcomings of our life were thrown back on the public schools to be remedied. He sincerely hoped that the organization would be not only for teachers but also for people of various occupations and professions, in order that they might be united to throw light upon the subjecs of Household Economics.

Mr. Hartman of the Civic League spoke very interestingly of City Health and the various civic and individual problems as he saw them as related to Home Economics.

A constitution was adopted as a tentative working basis until the next annual meeting in May. The officers chosen were announced in the October number of the JOURNAL.

Home Economics Association of Greater New York.

The Association has planned monthly meetings for 1909 and 1910, the first meeting being held October 30th. The main purpose of this Association is to bring together workers in various fields that are closely allied with Home Economics. Some definite topic of practical import in New York City is selected for discussion, that for the first meeting being School Luncheons in New York City. A practical experiment in this line is under way, directed by Miss Mabel Kittredge. In view of the importance of the subject it is hoped to enlist the support of all school principals and teachers and the general public.

Among the working committees of this Association, that on Publicity aims to collect for the members literature of value . At the June meeting, for instance, when Dr. Darlington lectured on the work of the Board of Health, all the health pamphlets issued by the City were displayed, as well as other pamphlets for free distribution, among them those published by the U. S. Department of Agriculture. The Committee on Nutrition is to investigate dietetic conditions in New York City, and collect the data already in existence.

Literature on Methods of Teaching Home Economics.

Many queries are received from teachers and others interested in introducing this work, with regard to a book on methods and courses of study. There is very little published in book form, but in the last five years material of value is to be found in reports of associations and in magazines. The following list gives some of these reports. Will those who know of other reports, send the titles, etc., to the Secretary of the American Home Economics Association, 525 West 12th Street, New York?

(1) Proceedings Lake Placid Conference on Home Economics, 1908. Price $0.50. B. R. Andrews, Secretary A. H. E. A., 525 W. 120th St., N. Y

(2) Syllabus of Domestic Science for High Schools of Illinois. $0.10. Department of Household Science, University of Illinois, Urbana, Ill.

(3) Course of Instruction, Technical High School, June, 1907. Technical High School, Springfield, Mass.

(4) Board of Education, District of Columbia, 1908–1909. Outline Course of Study in Domestic Science Department. N. T. Elliott Printing Company, Washington, D. C.

(5) Fourth Yearbook of the National Society for the Scientific Study of Education, Part II. "The Present Status and Future Development of Domestic Science Courses in the High School," by Mrs. Richards. The University of Chicago Press, Chicago, Ill.

(6) Report of Eastern Manual Training Association, 1904–1905. $0.25 to $0.50. Thellwell R. Coggeshall, 1505 Centennial Avenue. Philadelphia, Pa.

(7) Manual Training Magazine, April, 1909. $0.35. "Some Phases of Household Arts in the Secondary Schools," by Helen Kinne. The Manual Arts Press, Peoria, Ill.

Cost of Feeding City Prisoners. The cost of feeding the prisoners in the county jail and those in the city prison in the city and county of San Francisco during the nine months ended April 1, is reported by the Sheriff and Chief of Police respectively to have been as follows: In the county jail the average number of prisoners was 360. The average cost of feeding and clothing each was 23 cents per day. The cost of feeding does not include the board of jailers and guards, the care of the van and commissary's horses, etc., which totals about $11,000 annually and which items are charged to the appropriation for maintenance of prisoners. The breakfasts furnished consisted on week days of mush and syrup, one-half loaf of bread and one and one half pints of coffee. Dinner and supper consisted, on Mondays and Wednesdays, of pork and beans, 1½ pints of bean soup, ½ loaf of bread and one pint of coffee; on Tuesdays, Thursdays, Saturdays and Sundays, of 1½ pints of vegetable soup, 8 ounces of meat, potatoes, ½ loaf of bread and one pint of coffee; and on Friday, of 8 ounces of fresh fish or codfish, one-half loaf of bread and one pint of coffee. Felony prisoners and those not working are allowed but two meals, while those who work are given three.

In the city prison the average number of prisoners per month was 3,400. The average cost of feeding each prisoner three meals per day was 14¾ cents. Their breakfast consisted of 1½ pints of coffee, ½ loaf of bread, rolled oats mush and syrup. Dinner was 1½ pints of vegetable soup, 8 ounces of meat, potatoes and ½ loaf of bread. Supper was 1½ pints of tea and ½ loaf of bread. *The Municipal Journal and Engineer*, 26 (1909), No. 17, p. 718.

BOOKS AND LITERATURE.

Parcimony in Nutrition, J. Crichton-Browne. Funk and Wagnalls Co., London and New York, 1909, pp. vi,+iii.

In this volume the author gives reasons for his belief in a generous rather than a low proteid diet, drawing his evidence from personal experience, from considerations of public health, from the study of the animal functions, the effects of undernutrition of school children and of the poor, and from the general experience of mankind.

"The poor have much to learn in the way of economy of food, but it is economy in the selection and preparation of food, and not in the lopping off of proteid. The urgent question for us today is not how we may teach them to thrive on an attenuated fare, but 'whence shall we buy bread that these may eat?' We should aim not at parsimony in nutrition, but try to 'scatter plenty o'er a smiling land'."

Food Values—Practical Methods in Diet Calculations. *Bul. Amer. School Home Econ. Ser.* 1, 1909, No. 13, pl. 1, figs. 13.

Professor Irving Fisher's graphic method of calculating dietaries is explained. The tables given in his article are reprinted, as the edition of the original publication[a] is exhausted. The bulletin gives data for the nutritive value of a large variety of foods both on a uniform basis of portions supplying 100 calories of energy, and on the basis of composition and energy value per ounce. The latter data are compiled from publications of Dr. J. H. Kellogg.

State Supervision of Restaurants. *Amer. Food Jour.*, 4 (1909), No. 5, pp. 16, 17.

The necessity for such supervision is pointed out and some legislative enactments bearing on the subject are referred to.

Plastering the Outside of Old Dwellings, J. E. Wing, *Breeder's Gaz.*, 55 (1909), No. 19, pp. 1116, 1117.

On the basis of experience the author gives directions for covering the outside of old wooden buildings with plaster. It is found that such treatment is reasonably inexpensive and that they will remain in good condition for a long time.

Country School Houses, J. E. Wing, *Breeder's Gaz.*, 55 (1909), No. 19, p. 1117.

Suggestions are given for improvements in the construction, ventilation, etc., of rural school houses.

Concrete Construction About the Home and on the Farm (Pamphlet by Atlas Portland Cement Co., pp. 127; rev. in *Pure products*, 6 (1909), No. 5, p. 279).

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[a] J. Am. Med. Assn., 48 (1907), No. 16, pp. 1316–1325.

Method for Measuring the Capillary Absorption of Materials used in Construction, M. Pasquale, Ann. Ig. Sper., n. ser., 19 (1909), No. 1, pp. 123–137.

Marble, stone and other materials used in house construction, etc., are included in the author's investigation.

Textile Chemistry and Dyeing. L. A. Olney, Chicago. Amer. School of Correspondence. 1909, pp. 11 + 343.

A manual of instruction in the art of bleaching and dyeing.

The subjects of the sections are as follows: Chemical Study of the Fibres; Scouring the Textile Fibres; Bleaching of Wool; Bleaching of Cotton; Classification of Dyes; Application of Acid Dyes; Representative Acid Dyes; Testing the Fastness of Colors; Application of Basic Dyes to Wool and Silk; Basic Dyes on Cotton; Representative Basic Dyes; Application of Substantive Dyes to Cotton; Substantive Dyes on Wool and Silk; Representative Substantive Dyes on Cotton; Application of Mordant Dyes to Wool; Developed Dyes on Cotton and Silk; Sulphur Dyes on Cotton; Use of Logwood in Dyeing; The Minor Natural Dyes; The Mineral Dyestuffs; The Vat Dyes; The Testing of Dyestuffs; Chemical Reactions of Dyestuffs; Miscellaneous Tests in Dyeing; Testing the Fastness of Colors; and Analysis of Textile Fabrics. An appendix presents Useful Data for Dyers and Textile Chemists.

Laboratory Manual of Dyeing and Textile Chemistry. By J. Merritt Matthews, Ph.D., New York, John Wiley & Sons; London, Chapman & Hall, Ltd., 1909, 8vo., pp. xii + 363.

"This volume is designed with the purpose of meeting the demand for a text-book on the subject of textile dyeing and chemistry. . . The subject treated is a technical one, and an endeavor has been made to present it in a technical manner; that is to say, definite facts have been presented in a definite form. For this purpose, the experimental method has been adopted, further elucidation being given in additional notes as succinctly expressed as possible. The insertion of quiz questions has also been carried out in order to stir up the thought of the student after he has performed the manual experiment."

"This book is intended as an elementary manual for the students who are primarily to be found in the various textile schools and in institutions where the many branches of technical chemistry are taught. It is hoped that it will be of some value to both the student and the teacher. It is primarily a laboratory manual or guide, and is intended to direct and supplement the lectures of the teacher, and should be used in conjunction with the more general treatises on the subject."

"The subject matter is divided in such a manner as to provide a course of instruction for one complete college year, each section corresponding to a weekly apportionment of study."

The Theory of Dyeing, S. H. Higgins, *Chem. News*, 99 (1909), No. 2576, p. 169.

An interesting theoretical discussion of dyeing textile fibers.

Publications of American Home Economics Association.

Copies of the Proceedings of the Lake Placid Conference can still be secured through the American Home Economics Association, and various syllabuses and reprints as well, which are listed below.

PROCEEDINGS 1899–1908, complete file $8.00
Separates 1899–1901, $2.00; 1902, $1.00; 1903, $2.00; 1904, $1.00; 1905, $.50; 1906, $.50; 1907, $.50; 1908, $.50.

SYLLABUSES, 10c each: On Home Economics, Food, and Shelter. (Special rates in large numbers).

REPRINTS FROM THE PROCEEDINGS OF THE CONFERENCE
5c EACH

Brief reports of first and second conferences 1899–1900
Revaluations, Miss Caroline L. Hunt 1901
Reports of special committee on elementary and secondary schools (a special number—20 cents) 1901
Report of special committee on home economics in higher education 1902
Social conditions affecting the law of domestic life, Professor Charles R. Henderson, University of Chicago 1902
An Adirondack home institute, Mrs. Melvil Dewey 1902
Some controlling ideals of the family life of the future, Dr. Thomas D. Wood, Columbia University 1902
Cost of living for large numbers, Mrs. Melvil Dewey 1904
Report of teaching-section conference 1907
Status of the training of teachers of home economics in the U. S., 1907, Dr. C. F. Langworthy, U. S. Department of Agriculture (with lists of institutions reporting courses in home economics and those which train teachers.) 1907
Report of progress of food and nutrition, Dr. C. F. Langworthy, U. S. Department of Agriculture 1907
Woman's public work for the home, Miss Caroline L. Hunt 1907
Study of textiles, Miss Nellie Crooks, Teachers College, Columbia University 190
Report of progress in food and nutrition, Dr. C. F. Langworthy, U. S. Department of Agriculture 1908
College homes, Miss Martha Van Rensselaer, Cornell University 1908
The college table as an educational factor, Mrs. Miriam N. Loomis, Lasell Seminary 1908
Report of Teaching Section, Outline of College Entrance Course, 10c 1908
Adequate equipment for domestic science, Miss Helen Kinne 1908

Orders for the above may be sent to Benjamin R. Andrews Secretary, 525 West 120th Street New York City.

Press of W. F. Humphrey, Geneva, N. Y.

REF. STA

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THE AMERICAN HOME ECONOMICS ASSOCIATION

The American Home Economics Association which publishes the Journal of Home Economics aims "to improve the conditions of living in the home, the institutional household and the community," and unites all actively interested in home problems. Further information will be furnished on request by the Secretary. The annual membership fee is two dollars ($2.00). Names may be sent with the fee to the Secretary's office.